Essays on Corporate Governance and Corporate Finance

HENLEY BUSINESS SCHOOL

THE UNIVERSITY OF READING

ICMA Centre

YIWEI LI

May 2018

Declaration

I confirm that this is my own work and the use of all material from other resources has been properly and fully acknowledged.

Yiwei Li
May 2018

To my mother and father with love

黑夜给了我黑色的眼睛，我却把它献给了**phd**

我选择以水为师——高处高平， 低处低平

我选择以草为性命，如卷施，根拔而心不死

我选择渐行渐远，渐与夕阳山外山外山为一，而曾未偏离足下一毫末

我选择无事一念不生，有事一心不乱

Acknowledgements

First of all, I would like to express my sincere thanks to my supervisors, Dr. Carol Padgett and Professor Michael Clements, for their expert advice and encouragement throughout this journey.

Also, I must express my gratitude to the ICMA Centre for providing me a scholarship to carry out this study, and thank both academic and administrative staff, for their help and support during my four-year study.

In addition to my supervisors, I would also like to thank my friends and colleagues for their unfailing support and assistance. With a special mention to Yeqin Zeng, Chao Yin, Tiffany Thng, Ivan Sangiorgi, Lisa Schopohl, Xiaoyan Zhou, Yijun Meng, Xiaoman Su, Yushuang Jiang, Zary Aftab, Siqi Liu, Ning Zhang, Yiqing Zhao, and Wenyi Sun in general. It was fantastic to have the opportunity to share my life in Reading with your guys.

I would like to thank my eternal cheerleaders, my parents and my sister, for supporting my spiritually throughout this journey and my life in genereal.

Abstract

This thesis is a comprehensive study on how corporate governance structure and quality affect the corporate policies. First of all, I examine the effects of female directors on corporate debt maturity structures, using a dataset of S&P 1500 firms with 10,285 firm–year observations during 1997–2016. I find that firms with a higher ratio of female directors tend to have a larger proportion of short-maturity debt. This effect is more pronounced with female independent directors but insignificant with female inside directors. Then, I study the association between both the age of compensation committee members and the age dissimilarity between the CEO and compensation committee members and CEO compensation, using a dataset of FTSE 350 firms with 3,420 firm–year observations during 2002–2013. I find that both the age of committee members and the age dissimilarity from the CEO have negative impacts on the level of CEO total compensation and cash compensation. On the issue of how CEO's human capital influences corporate policies, I find that CEOs with general managerial skills can account for corporate investment inefficiency. CEOs who possess general managerial skills over broad work experience (generalist CEOs) have different risk-taking incentives compared with their counterpart CEOs, whose skills are only valuable within a specific organization (specialist CEOs). They may thus overinvest when there is a lack of efficient monitoring. Finally, I study the effect of firm-level tournament incentives on the level and value of firm cash holding, using a sample of 20,993 US firm–year observations over the 1992–2014 period. This paper investigates the impact of tournament incentives of the Chief Financial Officer (CFO) on the level and valuation of firm cash holdings. I document the higher propensities to keep larger cash holdings for firms with strong tournament incentives.

Table of Contents

List of Tables

Chapter 1 Introduction

1.1 Background and motivations

The motivation of this study comes from the growing interest in the role corporate governance plays in disciplining the behaviour of managers, helping align the interests of the managers with those of shareholders, and boosting firms' performance.

The plan of this thesis is straightforward. First, I discuss the role gender diversity plays in corporate boardroom of public firms, which has become a pressing issue around the world under the call for increasing the female directors in the boardroom. Second, I study the influence of the age of compensation committee members on CEOs' compensation, with the purpose of distinguishing the effect of board members' biographic characteristic on monitoring intensity. Third, I examine the relationship between the firms featuring CEOs with general managerial skills and investment efficiency, with the purpose to check the effect CEO's human capital plays in firm's policies. Fourth, I study the impact of firm level tournament incentives, namely, tournament incentive of CFO, on level and value of firms' cash holdings.

Conceptually, corporate governance research is based on two types of agency problems due to the potential of misalignment of interests between shareholders and managers. The first type of agency problem (Jensen & Meckilng, 1976; Coase, 1937) arises when managers' interests are not aligned with those of shareholders, while assuming that the interests of shareholders and those of board directors are closely aligned, as the main duty of board directors is to assure that managers act the in best interest of shareholders. Related literature regarding to the first type of agency problem includes papers that check the monitoring and scrutiny mechanisms that boards of director adopt to discipline the behaviour of managers to make sure that managers act in the best interests of shareholders, for example, executive compensation contracts. Contrary, the second type of agency problem arises when boards of directors fail to monitor the actions of managers, instead, their interests are aligned with those of managers but misaligned with those of shareholders (i.e., the board is composed of directors who have other social connections with managers before hold the directorship in the concurrent firms). Related literature regarding to the second type of agency problems includes papers that check independence of board of directors, co-opted boards, powerful CEOs, and entrenched CEOs, for example, shareholder proxy contests.

In 2006, the US, as mandated by the SEC, require publicly traded firms to disclose whether and how board diversity is considered in the director nominees' selection process. Also, several European Union countries require firms to undertake efforts to improve the diversity practices in the boardrooms and disclosure of these practices and some countries even impose quotas to bring more female directors to boards (i.e., Norway, Spain and France mandating 40% of board seats filled by women). Although there are ample rules which suggest the importance of the diversity in the boardroom, there is limited evidence on the impact of board diversity on corporate policies. Diversity is argued to have positive effects on board performance. For example, a growing body of research documents that diversity in the boardroom improves possibilities that different perspectives and unique ideas will be considered in the decision-making process, assuming that group diversity (i.e., biographic diversity or social category diversity) also carries informational diversity. In addition, board diversity can improve the independence thoughts in the boardroom, which enhance the monitoring role of boards. While board diversity can also bring costs to firms, for example, diversely comprised boards may generate higher decision-making costs in the boardroom due to the potential conflicts and frictions among team members. When it comes to the role diversity plays on firm performance, the empirical results from prior literature is mixed. In particular, this mixed results can be attributed to the endogenous nature of board diversity and corporate governance.

Despite the growing public interest in corporate governance and board diversity, certain other related issues are remaining unexplored (Campbell and Mínguez-Vera 2008; Gul, Srinidhi, and Ng 2011). Moreover, there are competing theories regarding both corporate governance and board diversity. In my thesis, I explore the role corporate governance and board diversity could play in the one type of important corporate policies, debt maturity structure. In addition, I not only focus on US settings, I also explore my study to the UK settings, where credit markets are more concentrated compared with that of the US. Especially, I study the the economic consequences of compensation committee composition in the context of CEO compensation based on data of FTSE 350 firms. Furthermore, I explore the different role the generalist CEOs and specialist CEOs plays on the corporate investment efficiency, assuming that Generalist CEOs face a broader set of outside options which in turn can act as the labour market mechanisms of tolerance of failure, are thus encouraged to take excessive risk. Finally, I study the how firm-level tournament incentives influence the level and valuation of the firms' cash holdings. By examining different institutional settings, I expand knowledge of how corporate governance, board members characteristics, CEOs' human capitals, and senior executives' tournament incentives impact corporate policies.

1.2 Overview of the thesis

The aim of this thesis is to explore how corporate governance, characteristics of board members, CEOs' human capital, and tournament incentives of senior executives impact corporate policies. In order to reach this goal, I first empirically investigate the role gender diversity plays on corporate debt maturity structures. Then, I study the age effect of the remuneration committee on CEO compensation plans using the UK setting. Followed by that, I check the effect of CEO's human capital on investment efficiency. Finally, I investigate the impact of firm level tournament incentive on the level and value of cash holdings of a firm. My thesis explores and deepens the understanding of the influences of corporate governance, board diversity, executive's human capital and tournament incentive on corporate policies.

Chapter 2 examines the effects of gender diversity on corporate debt maturity structures. I find that firms with a higher ratio of female directors tend to have a larger proportion of short-maturity debt. This effect is more pronounced with female independent directors but insignificant with female inside directors. These findings remain robust when I employ propensity score matching (PSM) and instrumental variable (IV) approaches to address potential endogeneity concerns. Furthermore, I find that the results are primarily driven by the subsamples of firms with weak governance quality and low financial constraints. I also find that there are no different effects between high and low leveraged firms, and a negative relation between female directors and likelihood of overinvestment. This evidence indicates that female directors view short-term debt as a monitoring device.

Chapter 3 studies the association between both the age of compensation committee members and the age dissimilarity between the CEO and compensation committee members and CEO compensation, using a dataset of FTSE 350 firms with 3,420 firm–year observations during 2002–2013. I find that both the age of committee members and the age dissimilarity from the CEO have negative impacts on the level of CEO total compensation and cash compensation. Moreover, I find that an excess CEO compensation level is also negatively associated with the ages of compensation committee members and the age dissimilarity between the CEO and compensation committee members. Additional identification methods include firm-fixed effects, propensity score matching (PSM), and sensitivity tests by controlling for CEO power. Also, I do not observe a significant effect of the age of outside directors on the level of CEO compensation.

Chapter 4 shows that CEOs with general managerial skills can account for corporate investment inefficiency. CEOs who process general managerial skills over broad work experience (generalist CEOs) have different risk-taking incentives compared with their counterpart CEOs whose skills are only valuable within a specific organization (specialist CEOs). Thus, they may overinvest in case of a lack of efficient monitoring. Using a sample of 15, 712 US firm-year observations over the 1993-2006 period, I find strong and robust evidence that firms featuring CEOs with general managerial skills are positively associated with investment inefficiency, more precisely, overinvestment. Moreover, I find that the positive relationship between the generalist CEOs and investment inefficiency are more pronounced in firms with poor corporate governance quality, firms with higher level of information asymmetry, and firms that are less financially constrained. Overall, these findings suggest that CEOs with general managerial skills distort corporate investment because they may lead to higher agency problems and feature higher risk-taking incentives compared with specialist CEOs. I conclude that human capital of CEOs play an important role in corporate investment policies.

Theory and earlier research suggest that tournament incentives will result in greater risk-taking by senior executives in order to increase their chance of promotion to the position of Chief Executive Officer (CEO). Chapter 5 investigates the impact of tournament incentives of the Chief Financial Officer (CFO) on the level and valuation of firm cash holdings. I posit that the option-like character of intra-organizational CEO promotion tournaments motivates managers to engage in projects with higher risk to exploit the relative performance evaluation feature of CEO promotion tournaments. First, I document the higher propensities to keep larger cash holdings for firms with strong tournament incentives (measured as the pay gap between the CEO and the CFO). Second, I find that this relationship is attenuated for firms with a stronger governance structure in place. Further, I find that equityholders' valuation of firm cash holdings is lower for firms with higher tournament incentives. Again, I find that this relationship is attenuated for firms with a stronger governance structure in place and is enhanced for firms with a higher leverage ratio.

Chapter 6 summarises the ideas and findings that are documented in this thesis, and concludes the contributions of this thesis.

Chapter 2. The impact of board gender composition on corporate debt maturity structures

2.1 Introduction

Gender diversity in the boardroom was originally advocated as a matter of justice and human rights; however, whether or not it also gives rise to a range of positive economic and development outcomes remains unclear. There has been a growing literature investigating the effect of gender-diverse boards since Norway initiated, and many other countries followed, mandatory requirements for gender diversity on boards. Insofar as it has been directly examined, a vast majority of studies have focused on the ultimate effects on firm value or financial performance (see, for example, Carter, Simkins, and Simpson (2003), Adams and Ferreira (2009), Farrell and Hersch (2005), and Ahern and Dittmar (2012)). However, since female directors may have different attitudes towards governance and bring a different kind of deliberation in discussions than their male counterparts, their influences could be embedded in the process of decision making.

Corporate debt maturity structure is not only one of the key elements of corporate financial policy, but it is also seen as an important corporate governance device. Barnea, Haugen, and Senbet (1980) argue that shorter-term debt can reduce managerial incentives to increase risk. Jensen (1986) notes the monitoring role of short-term debt in alleviating overinvestment behaviour. It also has been shown to alleviate the agency costs stemming from managerial discretion by subjecting managers to more frequent monitoring from debtholders (Rajan and Winton, 1995; Stulz, 2001). In sum, it is important to understand whether or not female directors influence corporate capital structure decisions by choosing a particular debt maturity structure and utilizing it as a monitoring device.

In this paper, I aim to provide evidence of the effect of gender diversity on corporate debt maturity by examining whether there are systematic differences in the choice of debt maturity in the presence of female directors. I argue that female directors place more emphasis on monitoring, and thus are more likely to use short-term debt as a governance mechanism to monitor managers' actions. First, empirical evidence suggests that female directors focus more on monitoring than male directors. Gender diversity in the boardroom thus has significant implications for board dynamics. The presence of female directors on boards brings not only different perspectives, skills, and knowledge, but also different values and norms (Miller and Triana, 2009; Gul, Srinidh and Ng, 2011). Moreover, gender-diverse boards are associated with more in-depth board deliberations and less conformity of attitudes (Clarke, 2005; Huse and Solberg, 2006; McInerney-Lacombe, Bilimoria and Salipante, 2008; Adams, Gary and Nowland, 2011). Gender diversity on boards thus encourages more competitive interactions in the boardroom as well as more effective board communication. In addition, recent studies indicate that female directors provide greater oversight and monitoring of managers' behaviour and actions. For example, Adams and Ferreria (2009) observe that female directors are more likely to undertake greater monitoring, attend more board meetings, and demand greater accountability for poor performance from managers.

Second, short-term debt can motivate managers to align their interests with shareholders' interests more effectively by reducing the cash flow available to be spent at the discretion of managers. Short-term debt therefore serves as an effective monitoring force by avoiding the potential for inefficient investments by managers and consequently controlling managerial overinvestment behaviour. The threat caused by failure to make short-term debt payment also enhances managers' incentives for improving the efficiency of fund utilization (Hart and Moore, 1994).

Given the characteristics of the monitoring from female directors and of short-term debt, it is possible that female directors are more likely to use short-term debt to monitor managers than male directors. I expect this effect to be weaker when overinvestment is less likely, i.e. when other corporate governance mechanisms are strong and managers are subject to financial constraints.

However, there are competing views that oppose my argument, and the influence of female directors on corporate governance is controversial. Corporations may use gender diversity only in order to convey the appearance that they are complying with social norms and expectations of how firms should behave, while in reality female directors might be marginalized and play no significant role in governance. If this is the case, I would not find an association between gender diversity and debt maturity. Moreover, some studies document unfavourable results with regard to board gender diversity. For instance, Ahern and Dittmar (2012) find that mandated female board representation caused a significant drop in firm value, mainly because the boards became younger and less experienced. Again, if this is the case, I would not be able to find systematic evidence of the association between gender diversity and debt maturity in situations when governance is critical.

I examine whether or not there is a positive relationship between female directors and short-term debt by using a sample of S&P 1,500 companies for the period 1997–2016. I show that firms with a greater proportion of female directors are more likely to adopt a shorter debt maturity structure than firms with a lower proportion of female directors. The results are more pronounced when only independent female directors are examined. The findings are robust when using the propensity score matching and instrumental variable approach to control for firm and debt characteristics and other potential endogeneity issues.

Probing further, I find that my full sample results are driven by firms with weak governance quality and higher governance needs, as proxied by the managerial entrenchment index (E-index) (Bebchuk, Cohen and Ferrell, 2009) and subsequent analysis. This finding is consistent with my main argument that, compared with male directors, female directors are more likely to adopt shorter debt maturity structure as a monitoring and governance mechanism in firms with weak corporate governance quality and higher corporate governance needs. I also find that the positive relationship between female directors and short-term debt disappears during a period of financial crisis (2007-2009) and for firms with financial constraints, since the overinvestment associated with a free cash flow agency problem decreases due to the decline in internal cash flow and financial constraints under those situations. I also attempt to address the concerns over the confounding effects from debtholders' monitoring by comparing different debtholders' power. My results show that the association between female directors and debt maturity structure does not vary across high and low leveraged firms. More directly, I further present evidence that female directors reduce the likelihood of overinvestment. I also exclude the alternative explanation that women in general are more risk-averse thereby more likely to choose less risky short-term debt, by comparing the effects from independent and inside female directors.

Taken together, the findings are consistent with my argument that female directors are more likely to use short-term debt as a corporate governance device and reduce the potential for managerial opportunism and self-serving overinvestment.

My study has at least three contributions to the literature. First, to the best of my knowledge, this is the first study to investigate the corporate debt maturity consequences of having female directors on board. Prior literature has controversial findings regarding the role that female directors can play, I provide evidence that female directors are positively related to the usage of short-term debt. These findings concur with research that finds female directors play a significant role in a series of important corporate decisions (see, for example, Levi, Li and Zhang, 2014; Carter, Franco, and Gine,2017; and Chen, Leung and Goergen, 2017).

Second, I contribute to a growing body of literature exploring various determinants of corporate debt maturity structure (e.g. Barclay and Smith, 1995; Guedes and Opler, 1996; Johnson, 2003; Billett et al., 2007; Brockman et al. 2010; Dang and Phan, 2016). I provide evidence that including female directors on the board is one of the factors that shapes corporate debt maturity policies.

Third, my study contributes to the literature that links gender diversity on boards to monitoring intensity (Adams and Ferreira, 2009; Gul, Srinidhi and Ng, 2011; Chen, Leung and Goergen, 2017). I note that female directors undertake more monitoring than their male counterparts as reflected by the use of short-term debt as a monitoring device in firms with weak corporate governance quality and higher corporate governance needs.

My paper is organized into seven sections. Section 2 discusses the related literature and develops my main hypothesis. In section 3, I present data sources, sample selection, variable definition, and summary statistics. Section 4 presents a discussion of my main regression results. Section 5 presents the sensitivity tests of my main results. Additional analysis is provided in section 6 and I conclude the paper in section 7.

2.2 Related literature and hypotheses

2.2.1 The role of female directors

Over the last two decades, there has been both a voluntary and mandatory increase in the proportion of women on corporate boards worldwide. However, since this is largely a result of the introduction of inclusion and gender equality for a balanced society, there has been a great deal of debate over whether or not boards with more female directors can be justified as a means towards a better economic growth. Driven by such a direct motive for understanding female directors' role, many studies have focused on the impact on firm value or financial performance. However, the findings are mixed. For example, Carter, Simkins, and Simpson (2003) find significant positive relationships between the proportion of female directors and firm value. In contrast, Ahern and Dittmar (2012) find that mandated female board representation led to deterioration in operating performance, since it resulted in younger and less experienced boards. Based on performance analysis but taking a more complex business environment into consideration, Farrell and Hersch (2005) suggest that gender diversity tends not to be a value-enhancing strategy but rather a response to the demand for either internal or external calls for diversity; Adams and Ferreira (2009) show that female directors have a significant impact on firm outcomes but the average effect of gender diversity on firm performance is negative; and that this negative effect is driven by companies with fewer takeover defences, suggesting that mandating gender quotas for directors can reduce firm value for well-governed firms. Post and Byron (2015) conduct a meta-analysis and conclude that board diversity is neither wholly detrimental nor wholly beneficial to firm financial performance. They suggest that board diversity may be leveraged to improve firm performance, but that would be conditional on different corporate environments. Taken together, these findings indicate that purely focusing on firm performance or value enhancement in investigating female directors' role may limit our understanding of the impact of gender diversity on boards.

Recent research investigates the role of female directors with a broader scope, considering aspects such as corporate strategy and a variety of corporate decisions. From the perspective of directors' monitoring role, Adams and Ferreira (2009) find that gender-diverse boards are associated with better attendance records, and that CEO turnover is more sensitive to stock performance in such firms; Nielsen and Huse (2010) show that there is a positive relationship between female directors and board strategic control; Levi, Li and Zhang (2014) show that firms with female directors decrease the likelihood of making acquisitions and pay lower bid premia; Carter, Franco, and Gine (2017) provide evidence that greater gender diversity on boards reduces the compensation gap between male and female executives; and Chen, Leung and Goergen (2017) find that firms with a larger proportion of female directors on their boards impose higher dividend payouts. These findings suggest that female directors are playing a different monitoring role than their male counterparts in the process of corporate decisions. However, despite increasing attention to the effects of gender diversity on corporate decisions, debt maturity structure, as one type of important corporate policy, has remained unexplored.

2.2.2 Debt maturity structure

Corporate debt maturity structure serves as an ideal setting for examining the behavioural traits of female directors versus their male counterparts in the boardroom, since it has been argued that it is not only one of the key elements of corporate financial policy but also an important corporate governance monitoring device. Traditionally, it has been viewed as the mechanism for matching investment opportunities (Myers, 1977; Barclay and Smith, 1995), signalling information to the market (Flannery, 1986; Kale and Noe, 1990; Diamond, 1991b; Rajan, 1992), and influencing tax liabilities (Brick and Ravid, 1985). There is also evidence that corporate debt maturity influences choice of leverage and covenants (e.g. Billett et al., 2007), long-term and short-term stock price performance and risk (Datta et al., 2000, Dang et al. 2017).

Considering the governance aspect of debt maturity, since debt with short maturities requires more frequent renewal or refinancing, it exposes the firm to higher liquidity risk (Myers, 1977; Diamond, 1991a). The exposure to high liquidity risk thus induces short-term debt to serve as a corporate governance device in controlling risky overinvestment behaviour (Smith and Warner, 1979; Barnea, Haugen and Senbet, 1980). Childs, Mauer, and Ott (2005) further argue that short-term debt can mitigate both under- and over-investment incentives by making the debt less sensitive to changes in firm value and by allowing for more frequent repricing of debt. Overall, to the extent that managers are subject to greater scrutiny and monitoring, short-term debt serves as a monitoring device for curbing managers' risk-seeking behaviour.

However, the arguments of prior literature for the monitoring role of short-term debt derive mainly from the belief that it is debtholders' choice of debt maturity or other contractual devices that subjects managers to more frequent or enhanced monitoring (Rajan and Winton, 1995; Stulz, 2001). I argue that, given the monitoring capacity of short-term debt, it is likely that other parties, such as female directors, may also employ it as a monitoring device to alleviate agency cost. Therefore, controlling the factors that determine debtholders' tendency to utilize short-term debt as a monitoring device, in this paper I aim to understand whether or not female directors may be more likely than their male counterparts to use short-term debt as a monitoring device.

2.2.3 Female directors and debt maturity structure

Female directors bring different monitoring features to the board. Extant research from multidisciplinary perspectives suggests that gender diversity in the boardroom has significant implications for board monitoring. From the perspective of demographic characteristics, female directors increase the demographic diversity of the board, which helps to maintain the board's demographic difference from management (i.e., top executives). Westphal and Zajac (1995) show that powerful CEOs tend to appoint new directors who are demographically similar to themselves, and therefore secure support from board members. Carter, Simkins and Simpson (2003) argue that board diversity increases board independence due to the fact that directors with a minority gender, ethnicity, or cultural background might bring up questions that would not be raised by directors with a more traditional background. Correspondingly, Hillman et al. (2002) find female directors bring a variety of occupational expertise and knowledge, advanced education, and accelerated ties to other organizations. These characteristics may influence the strategic choices of the firm. Furthermore, prior research finds female directors tend to exert greater diligence in monitoring managers due to their demographic differences (Turner, 1982; Tsui, Egan and O'Reilly, 1992).

Social identity theory suggests that individuals possess a social identity based on their membership in distinct social groups or categories, for example, gender (Turner, 1982). The corporate governance literature also suggests that formal and informal social ties between directors and the CEO impede the effective monitoring role of directors (Hwang and Kim, 2009, 2012; Fracassi and Tate, 2012; Schmidt, 2015). Ray (2005) argues that directors in a diverse corporate board are more likely to critically examine each other's viewpoints; consider counter-arguments and resolve differences by discussion rather than by consensus; maintain the firm's conscience with regard to ethics and social responsibility; and display increased sensitivity to opportunities and threats to the firm from external environment. Stephenson (2004) reports that boards with more women are found to surpass all-male boards in their attention to audit and risk oversight and control, and more likely to ensure conflict of interest guidelines and a code of conduct for the organization; and McInerney-Lacombe, Bilimoria and Salipante (2008) find that female directors are associated with better organizational outcomes, and improve and facilitate "tough" decision-making. These findings suggest that female directors are associated with higher quality board deliberations and discussion of tough issues that could possibly constrain managers' behaviour and actions.

In addition, Adams and Ferreira (2009) find that female directors have better attendance records than male directors, and are more likely to join monitoring committees and demand greater accountability from managers for poor performance. However, they also find the effect of gender diversity on firm performance depends on the firm's governance quality, i.e. gender diversity has a positive impact on performance in firms that have weak governance but a negative impact in firms with strong governance. They argue that a possible explanation is that greater gender diversity could lead to over-monitoring in firms with strong governance. Similarly, Gul, Srinidh and Ng (2011) show that the presence of female directors on boards improves the quality of public disclosure and informativeness of stock prices through better monitoring, and that this benefit is particularly high in firms that are lacking strong governance.

Taken together, empirical evidence from prior literature suggests that the nature of female directors' deliberation when carrying out their monitoring roles is different to that of males; they also place more emphasis on monitoring. In turn, short-term debt has been argued to act as an effective monitoring device. On one hand, it can reduce the cash flow available for managers to spend at their discretion, thereby avoiding the potential for inefficient investments by managers and consequently controlling managerial overinvestment behaviour (Smith and Warner, 1979; Barnea, Haugen and Senbet, 1980; Childs, Mauer, and Ott, 2005). On the other hand, short-term debt can enhance managers' incentives to improve the efficiency of fund utilization, by avoiding failure to make frequent short-term debt payments (Hart and Moore, 1994; Rajan and Winton, 1995; Stulz, 2001).

Thus, based on prior empirical evidence that gender-diverse boards are associated with greater monitoring, I conjecture that, all else being equal, female directors are more likely than male to use a shorter debt maturity structure to monitor managers. Since the monitoring effects from female directors are subject to the quality of the corporate governance of companies whose boards they sit upon (Adams and Ferreira, 2009; Gul, Srinidh and Ng, 2011; Chen, Leung and Goergen, 2017), I further hypothesise that the association between female directors and short-term debt is weaker when other corporate governance mechanisms are stronger; and when overinvestment is less likely to happen.

The above discussion leads to the following predictions:

H1: female directors are more likely than male to use a shorter debt maturity structure to monitor managers

2.3 Data Sources and Sample Selection

To study the relationship between female directors and a firm's debt maturity structure, I use several databases to construct my main sample. Specifically, the gender information and corporate governance-related information are primarily from RiskMetrics, which provides director profiles for S&P 1,500 companies. My main sample period ranges from 1997 to 2016. Data on debt maturity and firms' characteristics is from Compustat. Following the earlier literature (Barclay and Smith, 1995; Brockman, Martin and Unlu, 2010; Datta, Iskandar-Datta and Raman, 2005), I restrict my analysis to industrial firms with SIC codes from 2000 to 5999. I delete those observations for which debt maturity breached sensible bounds (less than 0% or greater than 100%). All continuous variables are winsorized at the 1st and 99th percentiles to mitigate the impact of outliers. My final sample contains 10,285 observations based on 1,379 unique firms.

Variable definitions

Debt Maturity Structure. Earlier literature (e.g. Johnson, 2003; Datta, Iskandar-Datta and Raman, 2005) uses the proportion of debt due within three years as a proxy for debt maturity structure, while Brockman, Martin and Unlu (2010) measure debt maturity structure using both the proportion of total debt maturing in three years or less and the proportion of total debt maturing in five years or less. There is no particular reason to prefer one to the other. Thus, I present my findings using all available measures which can be deemed as short-term debt. Specifically, I measure debt maturity structure by using five proxies: the proportion of debt maturing in 12 months and less divided by total debt (ST1); the proportion of debt maturing in two years and less divided by total debt (ST2); the proportion of debt maturing in three years and less divided by total debt (ST3); the proportion of debt maturing in four years and less divided by total debt (ST4); the proportion of debt maturing in five years and less divided by total debt (ST5). This set of measures is also consistent with those employed in prior literature (see for example, Huang, Tan and Faff, 2016).

Gender Composition. My main variable of interest is gender composition in the boardroom which is measured as the proportion of female directors on the board. Specifically, presented as "Fraction of Female Dire" in my tables, gender composition is measured as the number of female directors divided by the total number of directors on the board.

Control Variables. Drawing on previous literature on debt maturity structures (e.g. Johnson, 2003; Datta, Iskandar-Datta and Raman, 2005; Brockman; Martin and Unlu, 2010; Custodio, Ferreira and Laureano, 2013; Harford, Klasa and Maxwell, 2014), I control variables for firms' general and financial characteristics, factors that are identified as directly influencing debt maturity structure, and governance features. First, following Johnson (2003) and Custodio, Ferreira and Laureano (2013), I control for both firm size and firm size squared. Firm size is considered to be correlated with debt maturity for various different reasons, such as economies of scale and information asymmetry. I measure firm size as the natural logarithm of market capitalization. I also include size squared as an additional control variable in order to capture the nonlinear relation between debt maturity and firm size as predicted by Diamond (1991b), and predict a negative coefficient. Firms with higher growth opportunities tend to use more short-term debt, since short-term debt can alleviate the underinvestment problems faced by firms with higher growth opportunities (Billett et al. 2007). Following Billett et al. (2007), I measure growth opportunities using the market-to-book ratio which is defined as the market value of the firm divided by the book value of total assets. Leverage is the ratio of total debts to total assets. I predict a negative relationship between firm leverage and short-term debt, because firms with high leverage are more likely to employ long-term debt to mitigate refinancing and default risk. According to Flannery (1986), firms with higher abnormal earnings are more likely to issue short-term debt as a signalling device. I thus expect a positive association between abnormal earning and short-term debt. I measure abnormal earnings as changes in income before extraordinary items from year t to year t+1 scaled by the market value of equity in year t. Following Barclay, Marx and Smith (2003), I include asset maturity in the regressions. I expect a positive relationship between asset maturity and debt maturity since firms tend to match their asset maturity with their debt maturity. I also include an Altman (1977) Z-score which is a proxy for the firm's credit quality and default risk, and I define the Z-score dummy as an indicator variable, taking the value of unity if the Z-score is greater than 1.81 and zero otherwise. I expect a negative relationship between short-term debt and the Z-score dummy because firms with high credit quality are able to issue long-term debt. I also control whether or not firms have credit ratings. Since unrated firms are more likely to be of lower credit quality than rated firms, unrated firms may be more likely to issue short-term debt. I measure the rating dummy as an indicator variable, taking a value of one if the firm has an S&P credit rating on long-term debt, and zero otherwise. According to Brick and Ravid (1991), when the term structure of interest is upward sloping, firms should lengthen their debt maturity due to the greater tax advantages of long-term debt. Thus, I further control for term structure and expect a negative relationship between it and short-term debt. Term structure is measured as the difference between the yield on 10-year government bonds and the yield on 6-month government bonds at the fiscal year end. In order to capture other boardroom characteristics, I include both the board size, which is measured as the natural log of the total number of directors on the boards, and the independent ratio, which is measured as the ratio of independent directors on the board to the total number of board directors in my regressions. I also include several CEO-specific characteristics to control CEO power which may constrain the monitoring roles that directors play. Dual role is a dummy variable that equals one if the CEO is also the chairman of the board, and zero otherwise. CEO age and tenure are measured as age of CEO and number of years CEO has been in the position, respectively.

Definitions of all variables can be found in Appendix A.1.

Model specification

To examine the relationship between the proportion of female directors on the board and the firm's debt maturity structure, I estimate the following regression model:

$$Debt\ maturity_{i,t} = \beta_0 + \beta_1 Fraction\ of\ Female\ Dire_{i,t} + \beta_2 Firm\ Size_{i,t} + \beta_3 (Firm\ Size)^2{}_{i,t} + \beta_4 MB_{i,t} + \beta_5 Leverage_{i,t} + \beta_6\ Abnormal\ Earning_{i,t} + \beta_7 Asset\ Maturity_{i,t} + \beta_8 Z-score\ Dummy_{i,t} + \beta_9 Rating\ Dummy_{i,t} + \beta_{10} Term\ Structure_{i,t} + \beta_{11} Board\ Size_{i,t} + \beta_{12}\ Independent\ Ratio_{i,t} + \beta_{13} Dual\ Role_{i,t} + \beta_{14} CEO\ Age_{i,t} + \beta_{15} CEO\ Tenure_{i,t} + \varepsilon_{i,t} \quad (2.1)$$

Where all variables are defined in Appendix A.1.

I do include two-digit Standard Industrial Classification (SIC) industry dummies and year dummies.

Descriptive statistics

Table 2.1 reports the summary statistics for the variables used for my analysis. For gender composition, the mean and median values of my sample firms are 0.121 and 0.096, respectively. My measurements for the dependent variable of short-term debt, namely ST1, ST2, ST3, ST4 and ST5, have mean values of 17.6%, 26.7%, 36.6%, 47% and 58.2%, respectively. These statistics are consistent with the figures reported in prior literature (Datta, Iskandar-Datta and Raman, 2005; Brockman, Martin and Unlu, 2010; Dang and Phan, 2016). Most of the control variables in my sample show similar values to those presented in Datta, Iskandar-Datta and Raman (2005), Brockman, Martin and Unlu (2010), and Dang and Phan (2016) too.

Table 2.1 Descriptive statistics

This table presents summary statistics for my main variables, including the number of observations, the mean, standard deviation, 25th percentile, median, and 75th percentile. My sample contains 10,285 firm–year observations during the period from 1997 to 2016. The variable definitions are presented in Appendix A.1. All the continuous variables are winsorized at the 1st and 99th percentiles.

VARIABLES	(1) N	(2) mean	(3) sd	(6) p25	(7) p50	(8) p75
ST1	10,285	0.176	0.245	0.016	0.084	0.216
ST2	10,285	0.267	0.281	0.056	0.178	0.366
ST3	10,285	0.366	0.305	0.128	0.291	0.521
ST4	10,285	0.470	0.316	0.226	0.413	0.710
ST5	10,285	0.582	0.308	0.349	0.551	0.900
Fraction of Female Dire	10,285	0.121	0.096	0.000	0.111	0.182
Fraction of Female Indep Dire	10,285	0.110	0.091	0.000	0.111	0.167
Fraction of Female Insider Dire	10,285	0.006	0.026	0.000	0.000	0.000
Firm Size	10,285	8.436	1.556	7.274	8.308	9.495
(Firm Size)2	10,285	73.590	27.120	52.910	69.030	90.150
MB	10,285	1.811	0.974	1.194	1.497	2.080
Leverage	10,285	0.183	0.131	0.082	0.161	0.264
Abnormal Earnings	10,285	0.005	0.116	-0.013	0.004	0.019
Asset Maturity	10,285	11.560	10.370	4.027	7.904	15.820
Z-Score Dummy	10,285	0.881	0.324	1.000	1.000	1.000
Rating Dummy	10,285	0.659	0.474	0.000	1.000	1.000
Term Structure	10,285	0.017	0.012	0.006	0.018	0.027
Board Size	10,285	2.243	0.234	2.079	2.303	2.398
Independent Ratio	10,285	0.737	0.154	0.667	0.778	0.875
Dual Role	10,285	0.458	0.498	0.000	0.000	1.000
CEO Age	10,285	54.630	11.500	51.000	56.000	60.000
CEO Tenure	10,285	7.737	6.653	3.000	6.000	10.000
Analyst Coverage	10,285	1.664	1.143	0.000	1.946	2.639
E-index	6,127	3.004	1.354	2.000	3.000	4.000
Dividend	10,285	0.669	0.470	0.000	1.000	1.000
INew	9,838	0.059	0.085	0.009	0.036	0.085
Cash	9,838	0.117	0.146	0.019	0.059	0.156
Age	9,838	3.253	0.733	2.773	3.367	3.784
Size	9,838	7.874	1.505	6.727	7.745	8.899
V/P	9,838	0.570	0.340	0.345	0.506	0.716
Return	9,838	0.126	0.437	-0.137	0.077	0.301
Tangibility	9,838	0.322	0.219	0.145	0.265	0.470

2.4 Empirical Results

Baseline regression results

Table 2.2 reports the baseline regression results on how board gender composition affects the corporate debt structure using multiple proxies for short-term debt maturity. In line with my hypothesis, the estimated coefficient on *Fraction of Female Dire* is positive and significant when I use ST1, ST2, or ST3 as the dependent variables, but insignificant when using ST4 and ST5 as the dependent variables. In light of the similarity of the results across three proxies for the dependent variable (ST1, ST2 and ST3), I discuss the regression results using ST1, i.e. the proportion of debt due within 12 months.

In Table 2.2, Column (1), I present the results of estimating Equation (2.1) using ST1 as the dependent variable. Consistent with my expectations, I find the coefficient on *Fraction of Female Dire* is 0.109 and is statistically significant at the 10 percent level. This finding provides support for my hypothesis that firms with a higher proportion of female directors are more likely to issue short-term debt. In terms of economic significance, the coefficient in column (1) indicates that an increase of 10 percentage points in the fraction of female directors is associated with a 1.09 percentage point increase in the firm's short-term debt due within 12 months. Regarding control variables, consistent with earlier research and current theory (Datta, Iskandar-Datta and Raman, 2005; Brockman; Martin and Unlu, 2010, Huang, Tan, and Faff 2016), I find that ST1 is negatively associated with firm size but positively related with firm size squared. The estimated coefficients on leverage, Z-Score dummy, rating dummy and term are negative and statistically significant, consistent with the earlier studies. The estimated coefficients on

Market-to-Book ratio and Abnormal Earning are positive and statistically significant, which are also in line with previous literature (e.g. Datta, Iskandar-Datta and Raman, 2005; Brockman; Martin and Unlu, 2010, Huang, Tan, and Faff 2016).

Table 2.2 Female directors and debt maturity structures

This table presents estimation results from the pooled cross-sectional regressions of debt maturity on the fraction of female directors and control variables. The dependent variable is alternative measures of short-term debt, namely, ST1 (short-term debt due within 12 months), ST2 (short-term debt due within two years), ST3 (short-term debt due within three years), ST4 (short term debt during within four years), and ST5 (short-term debt within five years). The sample contains 10,285 firm-year observations for the period 1997-2016. All variables are defined in Appendix A.1. I control for industry and year fixed effects in all specifications. Standard errors are clustered in frim level. ***, **, and * denote significance at the 1 percent, 5 percent and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	ST1	ST2	ST3	ST4	ST5
Fraction of Female Dire	0.109*	0.115**	0.102*	0.068	0.033
	(1.911)	(2.023)	(1.801)	(1.212)	(0.565)
Firm Size	-0.156***	-0.202***	-0.234***	-0.197***	-0.138***
	(-4.554)	(-6.010)	(-6.975)	(-6.026)	(-4.176)
(Firm Size)2	0.009***	0.011***	0.013***	0.010***	0.007***
	(4.639)	(6.087)	(6.912)	(5.750)	(3.666)
MB	0.012*	0.007	0.002	-0.003	-0.001
	(1.810)	(1.073)	(0.283)	(-0.434)	(-0.196)
Leverage	-0.444***	-0.507***	-0.498***	-0.420***	-0.283***
	(-8.656)	(-9.088)	(-8.972)	(-7.572)	(-5.146)
Abnormal Earnings	0.043**	0.032	0.035	0.024	0.051**
	(2.409)	(1.633)	(1.586)	(1.137)	(2.491)
Asset Maturity	-0.000	-0.000	-0.001	-0.001**	-0.002***
	(-0.800)	(-0.847)	(-1.363)	(-2.194)	(-3.127)
Z-Score Dummy	-0.069***	-0.080***	-0.077***	-0.058***	-0.045***
	(-6.316)	(-6.400)	(-5.882)	(-4.336)	(-3.249)
Rating Dummy	-0.066***	-0.096***	-0.116***	-0.148***	-0.163***
	(-5.422)	(-7.220)	(-8.208)	(-9.745)	(-10.160)
Term Structure	-1.401	-2.020**	-2.423**	-2.929***	-1.480
	(-1.559)	(-2.062)	(-2.293)	(-2.782)	(-1.471)
Board Size	-0.013	-0.005	0.002	0.006	-0.002
	(-0.619)	(-0.220)	(0.067)	(0.246)	(-0.065)
Independent Ratio	-0.040	-0.047	-0.035	-0.028	-0.010
	(-1.235)	(-1.407)	(-0.990)	(-0.766)	(-0.280)
Dual Role	0.015*	0.010	0.007	0.011	0.006
	(1.716)	(1.080)	(0.769)	(1.112)	(0.618)
CEO Age	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.450)	(-0.760)	(-0.088)	(-0.180)	(-0.369)
CEO Tenure	0.001	0.001	0.000	0.000	0.000
	(1.021)	(1.268)	(0.561)	(0.060)	(0.183)
Constant	1.120***	1.442***	1.684***	1.648***	1.514***
	(7.024)	(9.374)	(11.101)	(11.239)	(10.222)
Observations	10,285	10,285	10,285	10,285	10,285
Adjusted R-squared	0.160	0.173	0.180	0.194	0.225
Industry dummy	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes

An alternative explanation for my results in Table 2.2 could be female directors' risk preference instead of their monitoring role. Levi, Li and Zhang (2014) suggest that firms with a higher percentage of female directors are less likely to make acquisitions, due to risk aversion. Faccio, Marchica and Mura (2016) find that firms run by female CEOs tend to be more risk averse. To the extent that the value of long-term debt varies more widely with unanticipated changes in the interest rate than the value of short-term debt, long-term debt is riskier than short-term debt.[1] As such, firms with more female directors might have a preference for short-term debt also because of high propensity of risk avoidance. To gain further insight into the mechanisms behind the increased short-term debt in the presence of female directors, I further break down female directors into two components, female independent directors and female insider directors. I posit that female independent directors, by undertaking more monitoring, will encourage short-term debt more. I would not observe different effects between female independent directors and female inside directors, should the positive association be due to women's tendency to be risk-averse. Results are presented in Table 2.3.

Panel A presents the results where the test variable is the fraction of female independent directors while Panel B presents the results for the fraction of female inside directors. In line with the main regression, Panel A in Table 2.3 shows that female independent directors are more likely to use short-term debt, and the results for ST1 and ST2 remain statistically significant, though ST3 becomes statistically insignificant. Similar to the discussion in the main regression, I discuss the results with reference to ST1 for the purpose of brevity. In Panel A, Column (1), I find that

[1] Although the literature discussed in the paper mainly shows that short-term debt will expose firms to high risk of refinancing, renegotiating and liquidity problems.

the estimated coefficient of the fraction of female independent directors is positive and statistically significant at the 5% level, indicating that firms with a greater fraction of female directors are more likely to use short-maturity debt (ST1) and this relationship is driven by female independent directors. In Panel B, Column (1), I find that the estimated coefficient of the fraction of female insider directors is statistically insignificant, supporting that the positive relationship between the fraction of female directors and short-term debt is due to female directors' monitoring intention instead of their risk preference.

Table 2.3 Board gender composition and debt maturity structures

This table presents estimation results from the pooled cross-sectional regressions of short-term debt on the fraction of female independent directors (Panel A) and the fraction of female insider directors (Panel B). For each panel, the dependent variable is alternative measures of short-term debt, namely, ST1 (short-term debt due within 12 months), ST2 (short-term debt due within two years), ST3 (short-term debt due within three years), ST4 (short term debt during within four years), and ST5 (short-term debt within five years). The sample contains 10,285 firm-year observations for the period 1997-2016. All variables are defined in Appendix A.1. I control for industry and year fixed effects in all specifications. Standard errors are clustered in firm level. ***, **, and * denote significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Panel A

VARIABLES	(1) ST1	(2) ST2	(3) ST3	(4) ST4	(5) ST5
Fraction of Female Indep Dire	0.115**	0.114*	0.085	0.052	0.024
	(2.021)	(1.948)	(1.433)	(0.863)	(0.381)
Firm Size	-0.156***	-0.202***	-0.234***	-0.197***	-0.138***
	(-4.552)	(-6.011)	(-6.983)	(-6.035)	(-4.181)
$(\text{Firm Size})^2$	0.009***	0.011***	0.013***	0.010***	0.007***
	(4.632)	(6.086)	(6.921)	(5.762)	(3.672)
MB	0.012*	0.007	0.002	-0.003	-0.001
	(1.809)	(1.070)	(0.276)	(-0.441)	(-0.199)
Leverage	-0.444***	-0.508***	-0.500***	-0.421***	-0.284***
	(-8.642)	(-9.089)	(-8.995)	(-7.596)	(-5.160)
Abnormal Earnings	0.043**	0.032	0.035	0.024	0.052**
	(2.399)	(1.627)	(1.589)	(1.141)	(2.493)
Asset Maturity	-0.000	-0.000	-0.001	-0.001**	-0.002***
	(-0.781)	(-0.819)	(-1.318)	(-2.161)	(-3.114)
Z-Score Dummy	-0.069***	-0.080***	-0.077***	-0.058***	-0.045***
	(-6.285)	(-6.378)	(-5.873)	(-4.333)	(-3.250)
Rating Dummy	-0.065***	-0.096***	-0.115***	-0.147***	-0.163***
	(-5.372)	(-7.168)	(-8.156)	(-9.715)	(-10.150)
Term Structure	-1.419	-2.040**	-2.441**	-2.941***	-1.485
	(-1.579)	(-2.081)	(-2.308)	(-2.791)	(-1.476)
Board Size	-0.012	-0.004	0.003	0.008	-0.001
	(-0.581)	(-0.165)	(0.145)	(0.305)	(-0.038)
Independent Ratio	-0.048	-0.055	-0.039	-0.030	-0.011
	(-1.478)	(-1.612)	(-1.091)	(-0.803)	(-0.294)
Dual Role	0.014*	0.010	0.007	0.011	0.007
	(1.697)	(1.076)	(0.796)	(1.139)	(0.633)
CEO Age	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.428)	(-0.740)	(-0.077)	(-0.174)	(-0.367)
CEO Tenure	0.001	0.001	0.000	0.000	0.000
	(1.029)	(1.264)	(0.534)	(0.036)	(0.170)
Constant	1.125***	1.447***	1.687***	1.649***	1.514***
	(7.047)	(9.391)	(11.108)	(11.247)	(10.224)
Observations	10,285	10,285	10,285	10,285	10,285
Adjusted R-squared	0.160	0.173	0.180	0.194	0.225
Industry dummy	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes

Panel B

VARIABLES	(1) ST1	(2) ST2	(3) ST3	(4) ST4	(5) ST5
Fraction of Female Insider Dire	-0.041	0.087	0.222	0.184	0.167
	(-0.294)	(0.559)	(1.341)	(1.083)	(0.962)
Firm Size	-0.157***	-0.203***	-0.235***	-0.198***	-0.139***
	(-4.571)	(-6.051)	(-7.039)	(-6.073)	(-4.203)
(Firm Size)^2	0.009***	0.011***	0.013***	0.011***	0.007***
	(4.685)	(6.163)	(7.008)	(5.818)	(3.703)
MB	0.012*	0.007	0.002	-0.003	-0.001
	(1.782)	(1.047)	(0.265)	(-0.443)	(-0.198)
Leverage	-0.449***	-0.512***	-0.502***	-0.422***	-0.284***
	(-8.726)	(-9.163)	(-9.043)	(-7.624)	(-5.167)
Abnormal Earnings	0.044**	0.033*	0.036	0.025	0.052**
	(2.455)	(1.686)	(1.635)	(1.172)	(2.514)
Asset Maturity	-0.000	-0.000	-0.001	-0.001**	-0.002***
	(-0.632)	(-0.687)	(-1.240)	(-2.122)	(-3.099)
Z-Score Dummy	-0.069***	-0.081***	-0.078***	-0.059***	-0.045***
	(-6.313)	(-6.422)	(-5.933)	(-4.383)	(-3.281)
Rating Dummy	-0.064***	-0.095***	-0.115***	-0.147***	-0.163***
	(-5.295)	(-7.124)	(-8.169)	(-9.738)	(-10.180)
Term Structure	-1.421	-2.036**	-2.431**	-2.933***	-1.478
	(-1.582)	(-2.077)	(-2.297)	(-2.784)	(-1.470)
Board Size	-0.007	0.001	0.007	0.010	-0.000
	(-0.342)	(0.052)	(0.295)	(0.389)	(-0.006)
Independent Ratio	-0.031	-0.034	-0.019	-0.016	-0.002
	(-0.960)	(-1.012)	(-0.541)	(-0.448)	(-0.065)
Dual Role	0.016**	0.012	0.009	0.012	0.007
	(1.975)	(1.323)	(0.983)	(1.252)	(0.684)
CEO Age	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.464)	(-0.785)	(-0.121)	(-0.204)	(-0.387)
CEO Tenure	0.000	0.001	0.000	-0.000	0.000
	(0.817)	(1.079)	(0.416)	(-0.032)	(0.146)
Constant	1.116***	1.436***	1.677***	1.643***	1.510***
	(6.975)	(9.305)	(11.045)	(11.194)	(10.183)
Observations	10,285	10,285	10,285	10,285	10,285
Adjusted R-squared	0.159	0.172	0.180	0.194	0.225
Industry dummy	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes

2.5 Sensitivity Test

In the baseline regressions reported in Table 2.2, I control for several observable firm characteristics that have been shown to affect corporate debt maturity structures in prior literature. However, I still face a challenge when attempting to identify a causal effect of female board representation on corporate debt maturity structures. Female directors are not randomly assigned to firms; for example, managers who are more likely to issue more short-term debt may also be more likely to call for greater diversity in the boardroom. I apply both instrument variable and propensity score matching (PSM) approaches (e.g. Huang and Kisgen, 2013; Chen, Leung and Goergen, 2017) to mitigate potential endogeneity issues.

Propensity score matching (PSM) results

In the first stage, I pool the firms with female directors and firms without female directors, and predict the probability that a firm will appoint a female director. To run a logistic regression, I create a dummy variable as the dependent variable, *Female*, that equals one for firms with female directors and zero for firms without female directors. I predict the probability (i.e. the propensity score) from a logistic regression including various firm characteristics, such as firm size, profitability, leverage, credit quality and growth opportunities. I also control for industry and year fixed effect in the logistic regression. In Panel A of Table 2.4, I present the logistic regression results on the determinants of female directors. In line with prior literature (Adams and Ferreira, 2009; Chen, Leung, and Goergen, 2017), I find that firms with a larger size and larger boards are more likely to have female directors on the board. The pseudo R-squared for the logistic regression is high, with a value of 0.330.

Then, I employ the propensity scores obtained from the logistic regression and perform a one-to-one nearest neighbour match. Specially, each firm with female directors on the board (i.e. the treatment sample) is matched to a firm with all male directors (i.e. the control sample). To guarantee that the treatment sample and the matching sample are sufficiently similar in terms of major firm characteristics, I apply the caliper-matching method, and require that the maximum gap between the propensity score of each treatment firm and that of its matched control firm does not exceed 0.5 percent in absolute value.

To ensure that there is no significant difference between the treatment sample and the matching sample in terms of observable characteristics, I adopt two diagnostic tests. My first diagnostic test consists of re-estimating the logistic regression for the post-match sample. The logistic regression results obtained using the post-match sample are reported in Column (2) of Panel A of Table 2.4. None of the estimated coefficients is statistically significant in the post-match sample, indicating that no factors that determine short-term debt maturity are significantly different after matching. The pseudo R-squared also decreases significantly from 0.330 for the pre-match sample to 0.006 for the post-match sample. This finding shows that through the PSM approach I have successfully removed the difference arising from all observable characteristics other than the difference in the presence of female directors.

The second test consists of comparing the difference for each observable firm characteristic between the treated and the control samples. In Panel B of Table 2.4, I report the summary statistics, the differences in means, and t-test results of the variables that are used in the matching process for both the treatment sample and the control sample. Indeed, none of the differences in means between the treatment sample and the control sample is statistically significant. In sum, both of the diagnostic tests indicate that I have successfully removed all observable differences other than the difference in the presence of female directors. This increases the likelihood that any difference in corporate debt maturity structure is because of the presence of female directors on boards.

Panel C of Table 2.4 presents the difference in the means of short-term debt between the treated and the control samples. The results suggest that there are significant differences in short-term debt due within 12 months at the 5 percent level. The results also indicate that there is no significant difference in short-term debt maturing in two years, three years, four years, and five years between the firms with female directors and the firms with all-male directors. Thus, the findings from applying the PSM mitigate the concern regarding self-selection bias and further confirm my hypothesis.

Table 2.4 Propensity score matching estimator

This table presents the PSM estimation results. Panel A reports the results from logit regression of the likelihood of the presence of female board members. The dependent variable is a dummy variable set to one if there are female directors on the board in a given year, and zero otherwise. Panel A presents the pre-match logit regression on the choice of having female directors and the post-match diagnostic regression. Panel B presents the univariate comparison between the treatment group (firms with female director) and the control sample (firms with all-male directors). Panel C presents estimates of the average treatment effects. The dependent variables include alternative measures of short-term debt, namely, ST1 (short-term debt due within one year), ST2 (short-term debt due within two years), ST3 (short-term debt due within three years), ST4 (short term debt during within four years), and ST5 (short-term debt due within five years). All variables are defined in Appendix A.1. I control for industry and year fixed effects in all specifications. Values of heteroscedasticity robust t-statistics are in parentheses. ***, **, and * denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Panel A

	(1)	(2)
VARIABLES	pre-match	post-match
Firm Size	0.336***	-0.018
	(5.332)	(-0.247)
MB	-0.114	0.017
	(-1.476)	(0.209)
Leverage	-2.115***	0.169
	(-3.744)	(0.291)
Abnormal Earnings	0.545***	0.148
	(2.681)	(0.658)
Asset Maturity	0.030***	0.000
	(2.820)	(0.033)
Z-Score Dummy	-0.471**	0.005
	(-2.430)	(0.026)
Rating Dummy	0.103	0.031
	(0.643)	(0.180)
Term Structure	-8.881	6.666
	(-1.018)	(0.628)
ROA	0.215	-0.557
	(0.235)	(-0.610)
Board Size	4.311***	-0.183
	(13.708)	(-0.546)
Independent Ratio	2.975***	-0.086
	(6.833)	(-0.196)
Dual Role	0.462***	0.071
	(3.907)	(0.546)
CEO Age	-0.002	0.001
	(-0.582)	(0.222)
CEO Tenure	-0.024***	-0.008
	(-2.987)	(-0.945)
Constant	-11.377***	0.650
	(-12.236)	(0.639)
Pseudo R-squared	0.330	0.006
Observations	10,282	3,598
Industry dummy	Yes	Yes
Year dummy	Yes	Yes

Panel B: Differences in firm characteristics

	Firm-year obs. With female dirs. (N=1799)	Firm-year obs. Without female dirs. (N=1799)	Difference	T-stat
Firm Size	7.623	7.653	0.031	0.762
$(\text{Firm Size})^2$	59.700	59.887	0.187	0.294
MB	1.746	1.759	0.012	0.378
Leverage	0.186	0.184	-0.002	-0.356
Abnormal Earnings	0.008	0.004	-0.004	-0.841
Asset Maturity	9.379	9.429	0.050	0.170
Z-score Dummy	0.911	0.913	0.002	0.176
Rating Dummy	0.497	0.495	-0.002	-0.133
Term Structure	0.016	0.016	-0.000	-0.909
Board Size	2.124	2.128	0.004	0.626
Independent Ratio	0.704	0.703	-0.001	-0.151
Dual Role	0.396	0.388	-0.008	-0.478
CEO Age	54.450	54.575	0.125	0.318
CEO Tenure	8.439	8.718	0.279	1.138

Panel C: PSM estimator

	Firm-year obs. With female dirs. (N=1799)	Firm-year obs. Without female dirs. (N=1799)	Difference	T-stat
ST1	0.205	0.185	-0.020**	-2.092
ST2	0.303	0.288	-0.015	-1.353
ST3	0.413	0.398	-0.015	-1.306
ST4	0.525	0.511	-0.015	-1.247
ST5	0.641	0.639	-0.002	-0.195

Instrumental variable approach results

To further account for the endogeneity problem, following Huang and Kisgen (2013), I use an instrumental variable approach to extract the exogenous component from gender composition in the boardroom, and employ it to explain the corporate debt maturity structure. I adopt an instrument variable that captures the firm's likelihood of hiring female directors, while unrelated to corporate debt maturity structure, except through the variables that I control for. The first instrumental variable for a firm having female directors is a state-level gender status equality that is calibrated by Sugarman and Straus (1988). A higher state-level gender status equality value suggests more favourable gender equality in a state. This instrumental variable is also used by Huang and Kisgen (2013). The logic of using this instrument is that the more positive a state is towards women's equality in general, the more likely a firm located in that state is to hire female directors. I assign each firm a state-level gender status equality value based on the firm's headquarters' location. Thus, I argue that the higher the state-level gender status equality, the greater should be the fraction of female directors on the board.

Table 2.5 exhibits the two-stage least squares (2SLS) results. Panel A of Table 2.5 reports the first-stage regression, where the fraction of female directors on the boards is the dependent variable. The explanatory variables include the instrumental variable (state-level gender status equality value) and the same control variables as used in the baseline model. For brevity, I do not tabulate the coefficient estimates of the explanatory variables except for the main variable of interest. The coefficient on the instrumental variable (state-level gender status equality value) carries a positive coefficient and is statistically significant at 1 percent. Consistent with the rationale behind the instrumental variable (Huang and Kisgen, 2013), state-level gender status equality value significantly explains the gender composition of the board. I also report the F-statistic, which is very high for the first-stage regression, indicating that the instrumental variable is not weak. Moreover, to ensure that the instrumental variable is acceptable, I perform a Cragg-Donald's Wald F weak-instrument test. The P-value of the Cragg-Donald's Wald F weak-instrument test statistic is 0.000, rejecting the null hypothesis that the instrument is weak (Cragg and Donald, 1993; Stock and Yogo, 2005) and suggesting that the instrument variable is valid.

Panel B of Table 2.5 shows the second-stage regressions, where the dependent variables are alternative proxies for short-term debt, namely ST1, ST2, ST3, ST4, and ST5. I replace the *Fraction of Female Dire* with the predicted value of the fraction of female directors on boards. The coefficients on the predicted values of the fraction of female directors on boards are positive and statistically significant at the 1 percent level, 5 percent level, and 10 percent level when I use ST1, ST2, and ST3 as the dependent variables, respectively, echoing the results from my main results in Table 2.2. Again, my findings on the control variables are largely in line with the earlier literature (Datta, Iskandar-Datta and Raman, 2005; Brockman, Martin and Unlu, 2010). This is consistent with my main hypothesis, and indicates that the key result is not unduly influenced by endogeneity.

Overall, after subjecting the results to a battery of tests to account for both self-selection bias and endogeneity, my results still hold – i.e. firms with female directors on their boards tend to adopt a short-term debt maturity structure. The results from sensitivity tests in this section enhance the argument that the gender composition of boards affects corporate debt maturity structure.

Table 2.5 IV estimator

This table presents the two-stage least squares regression results from Equation (2.1). The instrumental variable is the state-level gender status equality value. Panel A reports the results from the first-stage OLS regressions with the fraction of female directors as the dependent variable as well as several instrument validity tests, including F-statistics for excluded instruments and Cragg–Donald's Wald statistic for weak instrument. Panel B presents the second-stage regression results, where the dependent variable is an alternative proxy for short-term debt, namely ST1 (short-term debt due within one year), ST2 (short-term debt due within two years), ST3 (short-term debt due within three years), ST4 (short term debt due within four years), and ST5 (short-term debt due within five years). All variables are defined in Appendix A.1. I control for industry and year fixed effects in all specifications. Values of heteroscedasticity robust t-statistics are in parentheses. ***, **, and * denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Panel A : First-stage regression	**Dependent variable: Fraction of female directors**
Variable	
The state-level gender status equality value	0.001***
	(3.212)
Controls	Yes
Industry Dummy	Yes
Year Dummy	Yes
Observations	10,188
F-statistics	22.710
P-Value	0.000
Cragg-Donald (CD) Wald F-statistics	77.299
Stock-Yogo (2005) weak ID test critical value	16.380

Panel B

VARIABLES	(1) ST1	(2) ST2	(3) ST3	(4) ST4	(5) ST5
Fraction of Female Dire	2.012***	1.828**	1.305*	0.972	0.307
	(2.590)	(2.323)	(1.683)	(1.217)	(0.364)
Firm Size	-0.141***	-0.188***	-0.223***	-0.189***	-0.134***
	(-3.330)	(-4.611)	(-5.920)	(-5.313)	(-3.994)
$(\text{Firm Size})^2$	0.007***	0.010***	0.012***	0.010***	0.006***
	(2.930)	(4.175)	(5.407)	(4.688)	(3.322)
MB	0.016**	0.011	0.005	-0.001	-0.001
	(2.019)	(1.396)	(0.627)	(-0.155)	(-0.179)
Leverage	-0.340***	-0.413***	-0.430***	-0.368***	-0.266***
	(-4.705)	(-5.546)	(-6.100)	(-5.208)	(-3.715)
Abnormal Earnings	0.024	0.015	0.020	0.013	0.047**
	(1.105)	(0.672)	(0.815)	(0.589)	(2.158)
Asset Maturity	-0.002**	-0.002**	-0.002*	-0.002**	-0.002**
	(-2.126)	(-2.017)	(-1.954)	(-2.257)	(-2.414)
Z-Score Dummy	-0.051***	-0.064***	-0.065***	-0.049***	-0.042***
	(-3.114)	(-3.753)	(-4.061)	(-3.079)	(-2.655)
Rating Dummy	-0.096***	-0.124***	-0.137***	-0.164***	-0.170***
	(-4.671)	(-6.000)	(-6.943)	(-8.232)	(-8.309)
Term Structure	-1.104	-1.676	-2.210**	-2.739**	-1.368
	(-1.065)	(-1.533)	(-1.977)	(-2.515)	(-1.327)
Board Size	-0.113**	-0.095*	-0.060	-0.041	-0.015
	(-2.169)	(-1.810)	(-1.204)	(-0.802)	(-0.283)
Independent Ratio	-0.221***	-0.212***	-0.152*	-0.117	-0.039
	(-2.726)	(-2.587)	(-1.886)	(-1.423)	(-0.468)
Dual Role	-0.017	-0.019	-0.013	-0.005	0.001
	(-0.981)	(-1.039)	(-0.749)	(-0.260)	(0.054)
CEO Age	-0.000	-0.000	0.000	0.000	-0.000
	(-0.165)	(-0.396)	(0.121)	(0.015)	(-0.228)
CEO Tenure	0.003**	0.002**	0.001	0.001	0.000
	(2.258)	(2.127)	(1.244)	(0.650)	(0.154)
Constant	1.177***	1.491***	1.714***	1.669***	1.513***
	(6.418)	(8.481)	(10.432)	(10.680)	(9.954)
[2]Observations	10,188	10,188	10,188	10,188	10,188
Industry dummy	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes

[2] I do not repot adjusted R-squared here, because adjusted R-squared in IV regression may be misleading.

2.6 Additional tests

The role of corporate governance

My study so far has included a limited number of corporate governance characteristics which may influence the relationship between the gender composition of boards and corporate debt maturity structures. If firms with female directors are more likely to employ short-term debt as a corporate governance device, then I conjecture that the positive impact of female directors on short-term debt should be more prominent in firms with weak corporate governance and/or high need of corporate governance. I use the entrenchment index of Bebchuk, Cohen and Ferrell (2009) (E-index) and analyst coverage as the proxies for the governance monitoring mechanisms.

The E-index is based on six anti-takeover provisions and formed by calculating the indication variables for each of the six provisions (staggered boards, limits to shareholder bylaw amendments, poison pills, golden parachutes, and supermajority requirements for mergers and charter amendments) for each firm. A higher E-index value suggests that a firm is less shareholder-friendly, has greater managerial entrenchment, and is more insulated from the external market for corporate control, indicating lower corporate governance quality. Analyst coverage is the natural logarithm of one plus the number of subsequent analysts who issue earnings forecasts for the firm. A higher analyst coverage suggests a lower level of information asymmetry between managers and outside investors, indicating stronger external monitoring and better governance quality.

Column (1) and Column (2) of Table 2.6 present the subsample results for weak governance firms and strong governance firms respectively based on the median value of their E-index. The dependent variable in these columns is short-term debt due within 12 months. Note that the numbers of observations for these subsamples are smaller than those in the baseline model because E-index scores are not available for all firms in my sample. The coefficients on the fraction of female directors are positive for both subsamples, but significant only for firms with weak corporate governance, where managerial entrenchment effects are stronger. In a similar fashion, by splitting the sample by above-and below-median values of Analyst Coverage, column (3) and column (4) of Table 2.6 estimates high analyst coverage and low analyst coverage separately. The estimated coefficients on the fraction of female directors are only positive and significant for the low Analyst Coverage group (t=1.883). Overall, my findings suggest that corporate governance quality and the need for corporate governance affect the impact of female directors on corporate debt maturity structure. The results provide further support to my main argument that female directors, by undertaking more monitoring, are more likely to use short-term debt as a corporate governance device than their male counterparts.

Table 2.6 Board gender diversity, debt maturity structures and monitoring

This table reports the subsample analyses of the impact of governance monitoring mechanisms on the relationship between short-term debt and the fraction of female directors. The subsample period is from 1997 to 2016. I use managerial entrenchment index (E-index) and analyst coverage (the number of analyst following) to proxy for governance monitoring mechanisms. A low E-index indicates a below-median level of managerial entrenchment index and a high E-index indicates an above-median level of managerial entrenchment index. A low analyst coverage indicates a below-median level of analyst following and a high analyst coverage indicates an above-median level of analyst following. The dependent variable is short-term debt, namely ST1 (short-term debt due within one year). All variables are defined in Appendix A.1. I control for industry and year fixed effects in all specifications. Standard errors are clustered in frim level. ***, **, and * denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

VARIABLES	(1) High-E	(2) Low-E	(3) High-ANA	(4) Low-ANA
Fraction of Female Dire	0.147**	0.065	0.082	0.183*
	(2.294)	(0.569)	(1.201)	(1.883)
Firm Size	-0.100**	-0.170***	-0.063	-0.256***
	(-2.010)	(-3.594)	(-0.877)	(-3.599)
$(\text{Firm Size})^2$	0.005**	0.009***	0.004	0.014***
	(2.004)	(3.640)	(1.133)	(3.399)
MB	0.012	0.013	0.000	0.035**
	(1.177)	(1.339)	(0.033)	(2.493)
Leverage	-0.377***	-0.522***	-0.370***	-0.561***
	(-6.097)	(-5.514)	(-5.149)	(-7.063)
Abnormal Earnings	0.010	0.098**	0.031	0.024
	(0.284)	(2.284)	(0.860)	(0.642)
Asset Maturity	-0.001**	0.000	0.000	-0.001
	(-2.046)	(0.212)	(0.220)	(-1.229)
Z-Score Dummy	-0.068***	-0.063***	-0.039**	-0.095***
	(-4.888)	(-2.901)	(-2.568)	(-5.377)
Rating Dummy	-0.077***	-0.078***	-0.100***	-0.038**
	(-4.601)	(-3.703)	(-4.367)	(-2.305)
Term Structure	0.044	-5.927**	-2.565*	0.524
	(0.032)	(-2.305)	(-1.670)	(0.411)
Board Size	0.002	0.007	0.006	-0.032
	(0.061)	(0.187)	(0.176)	(-0.876)
Independent Ratio	-0.001	-0.022	0.067	-0.175***
	(-0.023)	(-0.352)	(1.544)	(-3.372)
Dual Role	0.007	0.041***	-0.012	0.036**
	(0.611)	(2.799)	(-1.044)	(2.384)
CEO Age	0.000	-0.000	0.000	0.000
	(0.622)	(-0.294)	(0.042)	(0.041)
CEO Tenure	-0.001	0.000	0.000	0.001
	(-0.850)	(0.327)	(0.305)	(0.689)
Constant	0.816***	1.202***	0.609*	1.592***
	(3.641)	(5.275)	(1.812)	(5.365)
Observations	3,988	2,155	3,758	3,894
Adjusted R-squared	0.149	0.194	0.160	0.207
Industry dummy	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes

The role of the financial constraints

Since I argue that short-term debt may be utilised by female directors as a monitoring device to minimize the likelihood of managers overinvesting, I conjecture that the association between the fraction of female directors and short-term debt is stronger when firms have less financial constraints, but weaker when firms are more likely to be subject to financial constraints. Following prior studies, I employ two proxies for financial constraints. The first one is Dividend, which is measured as an indicator variable with a value of one if the firm pays a dividend during the fiscal year t, and zero otherwise. Fazzari, Hubbard, and Petersen (1988) suggest that financially constrained firms tend to pay lower or no dividends to decrease the necessity of raising external funds in the future. Accordingly, I classify firms with positive-dividend paying as financially unconstrained firms; in contrast, firms with non-dividend paying are classified as financially constrained firms. Column (1) and Column (2) of Table 2.7 present the subsample results of estimating Eq (1) for zero-dividend and positive-dividend groups. I conjecture that female directors, by undertaking more monitoring, will promote more short-term debt in financially unconstrained firms. Consistent with my conjecture, I find that the estimated coefficient on the fraction of female directors is positive and significant only for financially unconstrained firms (positive-dividend paying firms).

The other measure of financial constraint used in my paper is related to the financial crisis period. The global financial crisis is commonly viewed by many economists as the worst since the Great Depression in the 1930s. During a financial crisis, corporate internal free cash flow decreases due to a decline in consumer wealth and a downturn in economic activity. Campello, Graham and Harvey (2010) also note that more than half of respondents in a survey of 1,050 Chief Financial Officers

(CFOs) cancelled or postponed their planned investment due to financial constraints during the crisis. Duchin, Ozbas and Sensoy (2010) examine the impact of the financial crisis on the corporate investment of US firms, and find that it declined prominently following the onset of the crisis. The overinvestment associated with the free cash flow agency problem decreases due to the decline in internal cash flow and financial constraints during the crisis period. Thus, if female directors are more likely to use short-term debt as a governance mechanism to constrain managers from overinvestment and managerial entrenchment, then I predict that the positive impact of female directors on short-term debt should be less significant during a financial crisis period. I classify firms into crisis-period and non-crisis period groups, and re-estimate Equation (2.1) for the two subsamples. 'Crisis period' is identified as the period of 2007–2009. Column (3) and Column (4) of Table 2.7 presents the subsample results for the crisis period and non-crisis period groups, respectively. As predicted, the positive association between female directors and short-term debt is statistically significant only for the non-crisis period group. In contrast, the coefficient on the fraction of female directors is not significant for the crisis period group, where managers are less likely to undertake self-serving overinvestment. Taken together, my results suggest that the positive impact of female directors on short-term debt is significant only for the non-crisis period subsample, because the financial crisis constrains managers from undertaking non-value-maximizing investment.

Table 2.7 Board gender diversity, debt maturity structures and financial constraints

This table reports the subsample analyses of the impact of financial constraints on the relationship between short-term debt and the fraction of female directors. The subsample period is from 1997 to 2016. To study the impact of financial constraints on the association between short-term debt and the fraction of female directors, I separate firms according to the likelihood of that firms suffering from financial constraints. In column 1 and 2, I classify firms based on the presence of dividends paying. In column 3 and 4, I divide my sample into two groups based on time (the financial crisis period sample (2007–2009) and the non-financial crisis period sample). The dependent variable is short-term debt, namely ST1 (short-term debt due within one year). All variables are defined in Appendix A.1. I control for industry and year fixed effects in all specifications. Standard errors are clustered in frim level. ***, **, and * denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)
VARIABLES	Div	Non-Div	Crisis	Non-Crisis
Fraction of Female Dire	0.158**	0.005	-0.022	0.135**
	(2.177)	(0.065)	(-0.221)	(2.329)
Firm Size	-0.161***	-0.120**	-0.219***	-0.145***
	(-3.856)	(-2.080)	(-3.276)	(-4.161)
$(\text{Firm Size})^2$	0.009***	0.007**	0.012***	0.008***
	(3.930)	(2.114)	(3.251)	(4.300)
MB	0.028***	-0.006	0.011	0.013*
	(3.291)	(-0.600)	(0.595)	(1.894)
Leverage	-0.354***	-0.511***	-0.445***	-0.443***
	(-5.328)	(-7.159)	(-4.670)	(-8.319)
Abnormal Earnings	-0.017	0.087***	0.074**	0.030
	(-0.721)	(3.215)	(2.010)	(1.444)
Asset Maturity	-0.000	-0.001	-0.001	-0.000
	(-0.493)	(-0.683)	(-0.955)	(-0.657)
Z-Score Dummy	-0.058***	-0.083***	-0.061**	-0.069***
	(-4.716)	(-4.190)	(-2.557)	(-6.393)
Rating Dummy	-0.049***	-0.112***	-0.052*	-0.067***
	(-3.556)	(-5.624)	(-1.945)	(-5.599)
Term Structure	-0.939	-1.866	1.558	-1.908*
	(-0.938)	(-1.184)	(0.649)	(-1.896)
Board Size	0.016	-0.082**	-0.026	-0.011
	(0.606)	(-2.466)	(-0.598)	(-0.503)
Independent Ratio	-0.093**	0.005	-0.031	-0.044
	(-2.259)	(0.103)	(-0.354)	(-1.355)
Dual Role	0.015*	0.024	0.005	0.017**
	(1.654)	(1.544)	(0.306)	(1.982)
CEO Age	0.000	-0.001	-0.002	-0.000
	(0.292)	(-1.054)	(-1.164)	(-0.241)
CEO Tenure	0.001	0.000	-0.000	0.001
	(1.124)	(0.366)	(-0.068)	(1.252)
Constant	1.069***	1.033***	1.550***	1.060***
	(5.278)	(4.080)	(5.127)	(6.486)
Observations	6,885	3,400	1,517	8,768
Adjusted R-squared	0.171	0.178	0.144	0.163
Industry dummy	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes

The role of leverage

To rule out the alternative explanation that debtholders are the party that determines corporate debt maturity structure, in addition to the variables controlling for debtholders' influence, I further examine whether the relationship between the fraction of female directors and corporate debt maturity structures is affected by firms' leverage levels. I use the median value of the leverage for my sample to classify firms into high leverage and low leverage, and re-estimate Eq (1) for the two subsamples. Column (1) and column (2) of Table 2.8 present the subsample results of estimating Eq (1) for high leverage firms and low leverage firms. I then conduct seemingly unrelated estimation to check the equality of the estimated coefficients between the low leverage group and the high leverage group. I find no difference between the effects of the fraction of female directors on firms' debt maturity structures for firms with low leverage level and firms with high leverage level, suggesting that the impact of the fraction of female directors on debt maturity structures is not conditional on the power of debtholders.

Table 2.8 Board gender diversity, debt maturity structures and financial leverage

This table reports the subsample analyses of the impact of financial leverage on the relationship between short-term debt and the fraction of female directors. The subsample period is from 1997 to 2016. To study the impact of financial leverage on the association between short-term debt and the fraction of female directors, I separate firms according to the leverage level. A low-leverage sample includes firm-years with below-median leverage level. A high-leverage sample includes firm-years with above-median leverage level. The dependent variable is short-term debt, namely ST1 (short-term debt due within one year). I conduct seemingly unrelated estimation to test the equality of estimated coefficients between two subsamples (Chi-square and p-value reported). All variables are defined in Appendix A.1. I control for industry and year fixed effects in all specifications. Standard errors are clustered in frim level. ***, **, and * denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

	(1)	(2)
VARIABLES	Low	High
Fraction of Female Dire	0.169***	0.082***
	(3.522)	(3.237)
Firm Size	-0.158***	-0.081***
	(-6.928)	(-5.356)
$(\text{Firm Size})^2$	0.009***	0.005***
	(7.048)	(5.568)
MB	-0.012***	-0.003
	(-2.699)	(-0.490)
Leverage	-1.871***	0.011
	(-20.556)	(0.388)
Abnormal Earnings	0.044	0.043***
	(0.901)	(3.115)
Asset Maturity	0.001	-0.001**
	(0.970)	(-2.218)
Z-Score Dummy	-0.050	0.000
	(-0.878)	(0.011)
Rating Dummy	-0.079***	-0.018***
	(-6.961)	(-2.869)
Term Structure	-1.721	-2.010**
	(-1.343)	(-2.407)
Board Size	0.004	0.027**
	(0.219)	(2.416)
Independent Ratio	-0.018	-0.007
	(-0.588)	(-0.413)
Dual Role	0.011	0.020***
	(1.212)	(4.012)
CEO Age	-0.001	0.000
	(-1.488)	(0.130)
CEO Tenure	0.001	0.000
	(1.118)	(0.342)
Constant	1.274***	0.451***
	(10.643)	(6.462)
Observations	5,171	5,114

Adjusted R-squared	0.195	0.170
Industry dummy	Yes	Yes
Year dummy	Yes	Yes
Subsample comparison of coefficients on female director ratio	Chi-square=0.79 (P-value=0.375)	

Investment efficiency

Since I argue that short-term debt serves as a monitoring device used by female directors to reduce the risk of management overinvestment, I further provide a direct test of the association between female director and investment inefficiency. Following Richardson (2006) and Stoughton et al. (2016), I estimate investment inefficiency from the following regression model:

$$INEW_{i,t} = \beta_0 + \beta_1 V/P_{i,t-1} + \beta_2 Leverage_{i,t-1} + \beta_3 Cash_{i,t-1} + \beta_4 Age_{i,t-1} + \beta_5 Size_{i,t-1} + \beta_6 Return_{i,t-1} + \beta_7 INEW_{i,t-1} + \delta_i + \mu_t + \varepsilon_{i,t} \quad (2.2)$$

where $INEW_{i,t}$ is the measure of new investment level for firm i in fiscal year t, consisting of total investment expenditure ($ITotal_{i,t}$) minus the investment expenditure necessary to maintain assets in place ($IMaintenance_{i,t}$). V/P is a proxy for growth opportunities. Leverage and Cash are the measures of financial constraints. Age is the natural log of (1+the number of years the firm has been listed on CRSP). Return is the change in the market value of the firm from t-1 to t. Size is the natural log of firm total assets at the beginning of year t. In order to control the effects of market movement and unobservable firm characteristics, I also include the year and firm fixed effects in my regression model. I define the absolute value of residuals of above regression model as my measure of firm-level investment inefficiency ($INF_{i,t}$). I further define over-investment proxy and under-investment proxy as $Under_{i,t} = |\varepsilon|$ if $\varepsilon<0$ and $Over_{i,t} = |\varepsilon|$ if $\varepsilon>0$, respectively. The separation of investment inefficiency into over-investment and under-investment helps us to distinguish the roles female independent directors play in mitigating investment inefficiency. Panel A of Table 2.9 presents the regression results of estimating Eq (2.2). The negative coefficient on V/P suggest that firms with high growth opportunities are associated with higher investment. The positive (negative) coefficient on Cash (Leverage) show that firms with less financial constraints are associated with higher investment. Furthermore, the negative coefficient on Size is consistent with the firm life cycle view on firm investment.

I now examine the roles of female independent directors on investment inefficiency using the following baseline model:

$$INF_{i,t} = \beta_0 + \beta_1 Fraction\ of\ Female\ Dire_{\ i,t-1} + \beta' X_{i,t-1} + \ \varepsilon_{i,t} \quad (2.3)$$

where the dependent variable $INF_{i,t}$ is my empirical measure of firm-level investment inefficiency. The test variable is the fraction of female independent directors. Controls in Eq (2.3) refer to the following two sets of control variables. The first set includes proxies for economic determinants of investment inefficiency adopted by Richardson (2006) and Stoughton et al. (2016): MTB, Leverage, Cash, Size, Tangibility, and Age. The second set of controls capture corporate governance characteristics: Board size, and Independent directors ratio. I also include year and industry (based on two-digit SIC codes) fixed effects.

Panel B of Table 2.9 presents the results of estimating Eq (2.3). The dependent variables are three different measures of investment inefficiency: $INF_{i,t}$, $Over_{i,t}$ and $Under_{i,t}$. The estimated coefficients on female independent directors are negative and statistically significant across Column (1) and Column (2), suggesting that female independent directors are negatively associated with total investment inefficiency and overinvestment. Meanwhile the estimated coefficient on female independent directors is statistically insignificant in Column (3) where the dependent variable is underinvestment, suggesting that female independent directors have no impact on under investment.

Table 2.9 Board gender diversity and investment efficiency

Panel A of this table reports the regression results of optimal investment expenditure. The determinants of investment include proxy for growth opportunities, leverage, firm age, size, cash, firm and year fixed effects. I use the absolute value of residuals as the proxy for investment inefficiency. The sample period is from 1998 to 2016. All variables are defined in Appendix A.1. Robust t-statistics are reported in parenthesis. ***, **, and * denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Panel B of this sample reports the regression results of the investment inefficiency on the ratio of female independent directors. The dependent variables are the investment inefficiency proxy variables: ine, over, under estimated by Eq (2.3). The sample period is from 1998 to 2016. All variables are defined in Appendix A.1. I control for industry and year fixed effects in all specifications. Standard errors are clustered in frim level. ***, **, and * denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Panel A

VARIABLES	(1) $INEW_{i,t}$
Leverage	-0.098***
	(-16.607)
Cash	0.146***
	(14.791)
Age	0.002
	(0.464)
Size	-0.015***
	(-6.758)
V/P	-0.043***
	(-11.990)
Return	-0.008***
	(-3.983)
INew	-0.012
	(-1.131)
Constant	0.233***
	(11.012)
Observations	9,838
Adjusted R-squared	11.56
Firm dummy	Yes
Year dummy	Yes

Panel B

VARIABLES	(1) Ine	(2) Over	(3) Under
Fraction of Female Indep Dire	-0.014*	-0.023*	-0.008
	(-1.787)	(-1.783)	(-1.155)
MB	0.002**	0.004**	0.001
	(2.326)	(2.299)	(1.070)
Leverage	0.004	0.001	0.006*
	(1.223)	(0.208)	(1.862)
Cash	0.037***	0.057***	0.032***
	(4.865)	(3.910)	(5.275)
Tangibility	-0.008	-0.013**	-0.008
	(-1.498)	(-1.998)	(-1.438)
Age	-0.001	0.001	-0.002***
	(-0.758)	(0.555)	(-2.597)
Size	-0.003***	-0.004***	-0.003***
	(-5.031)	(-4.641)	(-4.712)
Board Size	0.000	-0.001	-0.002
	(0.014)	(-0.118)	(-0.693)
Independent Ratio	0.004	0.006	0.003
	(0.741)	(0.689)	(0.706)
Dual Role	-0.002	-0.002	-0.002*
	(-1.552)	(-0.803)	(-1.660)
CEO Age	-0.000**	-0.000	-0.000*
	(-2.377)	(-1.449)	(-1.842)
CEO Tenure	0.000	-0.000	-0.000
	(0.375)	(-0.378)	(-0.024)
Constant	0.080***	0.104***	0.081***
	(7.420)	(6.416)	(7.957)
Observations	9,838	4,082	5,559
Adjusted R-squared	0.063	0.078	0.093
Industry dummy	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes

2.7 Conclusion

Incorporating female directors on boards has been emphasized by regulators, social activists and the media over the past two decades, and companies have responded to the call. However, investigation into female directors' impact remains limited. Adding to the main stream of research which explores female directors' direct effect on firm performance and firm value, I extend the emerging literature on female directors' monitoring role by examining whether or not the gender composition of boards affects corporate debt maturity structures. Prior literature suggests that female directors have a different kind of deliberation in board discussions and greater monitoring intensity than their male counterparts. Meanwhile literature on debt maturity structure suggests that short-term debt can serve as a governance monitoring device by subjecting managers to greater scrutiny, exposing them to higher liquidity risk, and reducing the cash flow available for overinvestment. Therefore, I hypothesise that boards with more female directors are more likely to use short-term debt as a monitoring device; and the effect is weaker when other corporate governance mechanisms are strong and overinvestment is less likely to happen.

My findings consistently support my hypothesis across different research methods and a variety of robust and additional tests. Specifically, I find that firms with a higher proportion of female directors tend to issue more short-term debt than firms with all-male directors. This finding is robust after considering unobservable heterogeneity, using the PSM and instrumental variable approaches. Further analysis shows that my full sample results are driven by firms with weak governance quality and higher governance needs, suggesting that female directors view short-term debt as a corporate governance mechanism in firms with weak corporate governance as well as higher governance needs. In addition, I find that the positive relationship between the fraction of female directors and short-term debt disappears when firms have financial constraints and during the financial crisis period (2007–2009), since the overinvestment associated with the free cash flow agency problem decreases due to the decline in internal cash flow and financial constraints during the crisis. Finally, a more direct test on the association between female independent directors and firm investment inefficiency shows that female directors are negatively associated with total investment inefficiency and overinvestment but not associated with underinvestment, suggesting that my underlying assumption that female directors utilize short-term debt to minimize the likelihood of overinvestment is more likely to be true. Overall, my findings contribute to three streams of literature and have practical implications. First, I provide evidence that female directors are positively related to the usage of short-term debt, adding to existing research that finds female directors play a significant role in a series of important corporate decisions. Second, I contribute to the literature that explores various determinants of corporate debt maturity structure, and provide evidence that female directors on the board is one of the factors that shapes corporate debt maturity policies. Third, I highlight that female directors undertake more monitoring than their male counterparts by using short-term debt as a monitoring device, especially when firms have weak corporate governance quality and higher corporate governance needs. This contributes to the literature that links gender diversity on boards to monitoring intensity. From the perspective of governance practice, my findings suggest incorporating female directors on a board could be a substitute governance mechanism that would, without them, be much needed.

Appendix A.1 Variable definitions

Variables	Definitions
ST1	The proportion of debt maturing in 12 months and less divided by total debt.
ST2	The proportion of debt maturing in 2 years and less divided by total debt.
ST3	The proportion of debt maturing in 3 years and less divided by total debt.
ST4	The proportion of debt maturing in 4 years and less divided by total debt.
ST5	The proportion of debt maturing in 5 years and less divided by total debt.
Fraction of Female Dire	The number of female directors on the board divided by board size.
Fraction of Female Indep Dire	The number of female independent directors on the board divided by board size.
Fraction of Female Insider Dire	The number of female executives on the board divided by board size.
Firm Size	The natural logarithm of market value of the firm.
$(\text{Firm Size})^2$	The square of firm size.
MB	Market-to-book ratio. The ratio of market value of assets to the book value of assets.
Leverage	The sum of short-term and long-term debts divided by total assets.
Abnormal Earnings	The ratio of the change between the income before extraordinary items adjusted for common or ordinary stock equivalents form year t to t+1 over the market value of equity in year t.
Asset Maturity	The ratio of property, plant, and equipment over depreciation times the proportion of property, plant, and equipment in total assets, plus the ratio of current assets to the cost of goods sold times the proportion of current assets in total assets.
Z-score Dummy	Dummy variable that equals one if Altman's Z-score is greater than 1.81, and zero otherwise.
Rating Dummy	Dummy variable that equals one if the firm has an S&P credit rating on long-term debt, and zero otherwise.
Term Structure	The difference between the yield on 10-year government bonds and yield on 6-month government bonds.
Board Size	The natural log of the total number of directors on the board.
Independent Ratio	The number of independent directors divided by board size.
Dual Role	Dummy variable that equals one if the CEO is also the chairman of the board, and zero otherwise.

CEO Age	The age of the current CEO.
CEO Tenure	The number of years the current CEO has hold the position.
ROA	The ratio of operating income before depreciation to total assets.
State-level gender status equality	Assign the state-level gender status equality value to each firms based on where the firm is headquartered.
E-index	An index, used in Bebchuk, Cohen and Ferrell (2009), and formed by cumulating the indicator variables for each of six antitakeover provisions for each firm.
Analyst Coverage	The natural log of (1 + the number of following analysts who issue earnings forecast during the fiscal year)
Size	The natural log of total assets at the start of year.
Age	The natural log of (1 + the number of years the firm has been listed on the CRSP)
Cash	Cash and short-term investment divided by the total assets at the start of year.
Return	The change of the market value of the firm.
INEW	The investment is measured by the sum of capital expenditure, research and development expenditure, research expenditure, acquisition and sale of property, plant, and equipment (Itotal) minus amortization and depreciation (IMaintenance) divided by the total assets at the start of the year.
V/P	Growth opportunities of the firm are proxied by the assets in place over the market value of the firm, where assets in place is measured as $(1-\alpha\gamma)BV + \alpha(1+\gamma)X - \alpha\gamma d$, $\alpha=\omega/1+\gamma-\omega$, $\gamma=12\%$, $\omega=0.62$, BV is the book value of assets, d is annual dividend, X is operating income after depreciation. (Richardson,2006)
Tangibility	The proportion of property, plants, and equipment in total assets.

Chapter 3 Older compensation committee members' better monitoring: evidence from the UK

3.1 Introduction

Business, academic communities, and policymakers have consistently shown an interest in executive compensation. CEO compensation in UK public firms has attracted a great deal of empirical work. Yet our understanding of the corporate governance determinants that drive CEO compensation, and especially how different compensation committees' structures impact CEO compensation, is still incomplete. The existing literature documents the association between both CEO compensation and pay for performance sensitivity and compensation committee composition. For example, Newman and Mozes (1999) find that when insiders sit on the compensation committee, CEO compensation practices are more favourable for the CEO, at the expense of shareholders. Sun and Cahan (2009) document that CEO cash compensation is more positively related to accounting performance for firms with higher compensation committee quality. However, the evidence has been mixed. Anderson and Bizjak (2003) do not find that less independent compensation committees have a lower association between CEO compensation and market-based measures of performance (stock return). I build on this literature by exploring the economic consequences of compensation committee composition in the context of CEO compensation.

In this study, I examine whether CEO compensation is affected by the composition of the compensation committees. Specifically, I provide evidence on (1) the association between CEO compensation and the age of compensation committee members, (2) the effect of the age similarity between the CEO and compensation committee members on CEO compensation. Age influences human beings' attitude, behaviour, ethical standards, and risk-preference. Earlier theoretical work has predicted that individuals become more ethical and conservative as they age (see, e.g., Deshpandee, 1997; Pfeffer, 1985; Rhodes, 1983; Serfling, 2014; Taylor, 1975). I then argue that older compensation committees are more likely to enhance the intensity of monitoring and improve governance quality. Specifically, I hypothesize that the age of compensation committee members is negatively associated with CEO compensation and excess CEO compensation. I test my hypotheses by performing multiple regression analyses on the sample of 3,420 observations for the period 2002–2013. I report a significant negative association between the age of compensation committee members and both CEO compensation and excess CEO compensation. My findings hold after using firm-fixed effects, employing a PSM approach and controlling the CEO power variables identified by earlier studies as being associated with CEO compensation.

I also investigate how the age similarity between the CEO and compensation committee members influences CEO compensation. According to Turner, Brown, and Tajfel (1979), an age and gender-diverse board is likely to shape in-groups and out-groups. Older (or younger) directors are more inclined to communicate and interact with other board members from the same age group. Furthermore, McPherson, Smith-Lovin, and Cook (2001) propose the "homophily principle," indicating that by interacting only with individuals who are like ourselves, our position and opinions get reinforced, while limiting any differences and the emergence of alternative opinions. In other words, board members of a similar age are likely to be mentally attuned and similarly minded. As a consequence, a similarity between executives and directors can reduce governance effectiveness and monitoring intensity. I therefore posit that the increasing age dissimilarity between the CEO and compensation committee members reduces the mutual attraction and interaction between them and thereby fosters the compensation committee members' cognitive independence and gives rise to cognitive conflict. This induces more intensive monitoring in the form of increased supervision and critical judgment of CEO compensation and avoids excessive levels of CEO compensation. Thus, older compensation committee members might take a more frequently scrutiny approach by steering clear excessive CEO compensation levels. By building links between excessive CEO compensation and both age and age similarity between CEO and compensation committee members, I check whether older compensation committee members use CEO compensation to expropriate the interests of shareholders. I then hypothesize that the increasing age dissimilarity between the CEO and compensation committee members enhances monitoring intensity, suggesting a negative association between the age dissimilarity between the CEO and compensation committee members and CEO compensation. I test my hypotheses by performing multiple regression analyses on the sample of 3,420 observations for the period 2002–2013. I find a significant negative relationship between the age dissimilarity between the CEO and compensation committee members and CEO compensation.

Using a sample of 3,420 firm–year observations from FTSE 350 firms for the period of 2002–2013, I find strong empirical support for my hypotheses about the effect of the age of compensation committee members and the age dissimilarity between the CEO and compensation committee members on monitoring intensity. Importantly, my main results remain robust after controlling for the endogeneity issue by employing the PSM method. Moreover, my main results hold after including the CEO power variable that may influence CEO compensation. I present my findings for both CEO total compensation and cash compensation. I emphasize the total pay and cash pay because cash compensation is especially relevant in UK firms, as it composes two-thirds of total CEO pay.

My study contributes to the corporate governance and CEO compensation literature by providing empirical evidence of an association between both the age of compensation committee members and the age similarity between the CEO and compensation committee members and CEO compensation. I also contribute to the emerging literature on the effect of how age and age dissimilarity influence individuals' behaviour patterns. The findings of my study have several implications. First, my study has policy implications for corporate governance regarding the composition of the compensation committee. Second, firms hiring older compensation committee members benefit by having more intensified monitoring.

The remainder of the paper is organized as follows. Section 2 provides a literature review and hypotheses. This is followed in Sections 3 and 4 by sample selection and research design. Sections 5–7 report the empirical results, robustness test, and sensitivity tests, followed by conclusions in Section 8.

3.2 Literature review and hypothesis development

3.2.1 Compensation committee quality and composition and monitoring intensity

Agency theory suggests that the goals and desires of managers, who may pursue self-interest and maximize self-wealth, are not closely aligned with the goals of the principals (here, the shareholders). As managers have more insider information than shareholders, information asymmetry arises. The combination of conflicts of interests between managers and shareholders and information asymmetry means that companies encounter agency costs. There are several methods to mitigate such an agency problem. Besides paying dividends and handling takeover threats, the board is the most generally used corporate framework to reduce agency cost. The board of directors regard themselves as monitors of managerial behaviour and guardians of shareholder wealth, and each sub-committees is committed to specific monitoring responsibilities.

The compensation committees play an important and deciding role in designing the CEOs' compensation contracts, and earlier literature has related compensation committee quality with the structure of CEO compensation. Sun, Cahan, and Emanuel (2009) note that the stock option grants to CEO are closely linked to future firm performance due to the enhanced quality of compensation committee and CEO compensation practices, finding that when insiders sit on compensation committees, CEO compensation practices are more beneficial to the CEO rather than the shareholders. Bugeja, Matolcsy, and Spiropoulos (2013) study the relationship between gender-diverse compensation committees and the level of CEO pay, suggesting that CEO total pay is negatively associated with the ratio of female members on compensation committees.

3.2.2 Age and monitoring intensity

The existing finance, accounting, and psychology literature suggests that age is positively associated with an individual's ethical standards and behaviour. Barnett and Karson (1989), in a study using 513 employees of an insurance company, report a positive relationship between age/career stage and ethical standards. Mudrack (1989) discovers that age is a determining factor in predicting individuals' ethical behavior. He indicates that older individuals have a greater and longer exposure to traditional culture and complicated situations and so behave more ethically. Arlow

(1991) also finds that younger respondents obtain a higher Machiavellian score than older groups. Ruegger and King (1992), in an experimental study of the determinants of student business ethics, find that age is a significant factor in making ethical decisions and that older individuals are more ethical than younger groups. Terpstra, Rozell, and Robinson (1993) investigate the influence of personality and demographics on individuals' ethical decisions related to insider trading, and find that younger individuals are more inclined to engaging in insider trading compared to older individuals.

Further, Brady and Wheeler (1996) suggest that age is a powerful determinant of ethical disposition. Deshpande (1997) finds that older respondents are more ethically conservative than younger respondents. Borkowski and Ugras (1998), in a meta-analysis of 35 studies that includes age as a factor, suggest that as people age, individuals' attitudes and behaviors seem to become more ethical. Peterson, Rhoads, and Vaught (1991) find that younger participants exhibit lower ethical standards when compared with older participants. Chan, Cheng, and Szeto (2002) report that younger Chinese executives are more inclined to tolerate less ethical or even illicit activities for profit than older executives. Hess, Osowski, and LeClerc (2005) examine the age difference in social-cognitive functioning and show that older individuals are more likely to make inferences consistent with the traits–diagnostic implications of the behavior than their younger counterparts. From all this earlier literature, I can demonstrate that age impacts an individual's behavior, attitude, risk-preference, and ethical standards; in particular, older individual exhibit higher ethical standards. According to Carroll and Buchholtz (2011), the board of directors is responsible for governance quality and scrutinizing the overall direction and functioning of the organization. Moreover, the board members who sit on compensation committees regard themselves as the guardians of monitoring CEO compensation. Here, I posit that older compensation committee members impose more intense monitoring on CEO compensation. This leads to the following hypotheses:

H1a: CEO total compensation and cash compensation is lower for firms with older compensation committee members.

H1b: Excess CEO total compensation and excess cash compensation is negatively associated with the age of compensation committee members.

3.2.3 Age dissimilarities and monitoring intensity

Tajfel (1978) first highlighted social identity theory, indicating that individuals use demographic attributes, such as age and gender, to define themselves as members of a social group. Consistent with social identity theory, Turner, Brown, and Tajfel (1979) find that age- and gender-diverse boards are likely to shape in-groups and out-groups, and develop “us vs. them” perceptions among their members. Older (or younger) directors are more likely to interact and communicate with other board members from the same age group, indicating that same-age-group individuals are easier to communicate and coordinate with and more likely to share their values and expectations (Twenge and Campbell, 2011). Moreover, according to Brewer (1979), out-group members are perceived as less trustworthy, more dishonest, and less cooperative. For instance, Tuggle, Sirmon, and Bierman (2011) show that separation of in-groups and out-groups based on gender makes female directors less likely to fully participate in male-dominated board meetings and less prepared to interact on the boards.

Westphal and Zajac (1995) report that CEOs who have influence on the board of director nomination process are inclined to appoint directors who share similar demographic attributes. In addition, they find that increased similarity between CEOs and board members in turn is positively related to increases in CEO compensation level.

McPherson, Smith-Lovin, and Cook's (2001) "homophily principle" suggests that people generally prefer to interact and communicate with others like themselves. Further, by interacting only with individuals who are like ourselves, my position and opinions are reinforced and validated while limiting differences and the emergence of alternative opinions.

As a result, similarity (gender, race, ethnicity, age, class background, educational attainment, etc.) between executive directors and supervisory directors can reduce corporate governance and monitoring intensity. In addition, Lee, Lee, and Nagarajan (2014) find that similarity in political beliefs between the CEO and other board members is associated with lower firm valuation and higher managerial entrenchment. Moreover, they show that shared political beliefs between CEOs and other board members lead to lower CEO pay–performance sensitivity, reduced turnover rate for poor firm performance, and higher likelihood of accounting fraud. Hwang and Kim (2009) develop and test a model that links CEOs' social ties with board members to monitoring effectiveness. They demonstrate that social ties can build on mutual alma mater, military service, regional origin, academic discipline, and industry. Moreover, they find that firms with fewer social ties between CEOs and board members exhibit a significantly lower level of total CEO compensation, higher pay–performance sensitivity, and greater turnover rates for poor firm performance, suggesting that social ties between CEOs and board members reduce the monitoring effectiveness of the board. Fracassi and Tate (2012) show that CEO–

director ties reduce firm value, increase the likelihood of engaging in value-destroying acquisitions, and weaken the intensity of monitoring from the board.

Thus, I posit that age dissimilarity between CEO and compensation committee members reduces mutual trust and attraction and thereby fosters the compensation committee's cognitive independence and risk of cognitive conflicts. In addition, I hypothesize that an age dissimilarity between the CEO and compensation committee members induces more intensified monitoring from the compensation committee. This leads to the following hypotheses:

H2a: CEO total compensation and cash compensation is lower for firms with a greater age gap between the CEO and compensation committee members.

H2b: Excess CEO total compensation and cash compensation is negatively associated with the age gap between the CEO and compensation committee members.

3.3 Sample selection

The final sample consisted of 3,420 observations with data collected in the following manner. All CEO compensation data, CEO attributes, and corporate governance characteristics were drawn from Boardex. Using this data I identified manually the CEO of each company. I then merged this data with the Bloomberg database. All accounting and market data, such as total assets and stock return used, were collected from Bloomberg. After excluding firms due to missing values in compensation details, accounting and market values, and corporate governance information, the remaining sample resulted in 3,420 firm–years. My sample comprises the UK's FTSE 350 index between 2002 and 2013.

3.4 Research design

My study focuses on the characteristics of sub-committees rather than the whole board, because sub-committees make decisions on specific firm policies. For example, the audit committees' main responsibility is guarding the firm's financial reporting quality and the nomination committees' main job is setting succession plans and finding a quality successor for the firm. My main interest is the level of CEO compensation, so I concentrate on the characteristics of the compensation committee, whose major duty is designing CEOs' contracts and linking CEOs' compensation with firm performance. In order to justify my argument about the influence of age and age similarity on individuals' behavior patterns, I first examine the association between both the age of compensation committee members and the age dissimilarity between the CEO and compensation committee members and both CEO total and cash compensation.

To test my hypotheses, my main model is as follows:

$$y_{it}=\beta_0+\beta_1 Age\_Comp_{it}(Age\_Dissimilarity_{it})+ \sum \beta_j\ Corporate\ Governance\ Characteristics_{it}+\sum \beta_K\ CEO\ Characteristics_{it}+ \sum \beta_l\ Economic\ Characteristics_{it}+\text{year dummy} +\text{industry dummy} +\varepsilon_{it} \quad (3.1)$$

Model specification and variables

Dependent variable

The dependent variable, y_{it} is the natural log of total compensation (LNTC), which is measured as the per-year sum of salary, bonus, other compensation, the value of stock options granted during the fiscal year, and the value of restricted stock or other equity granted during the fiscal year from Boardex. I also use the natural log of cash compensation, which is measured as the sum of base salary and annual bonus, as a robustness check.

Independent variable

The experimental variables, Age_Comp_{it} and $Age\_Dissimilarity_{it}$ equal to the average age of compensation committee members and the absolute value of the gap between the average age of compensation committee members and CEO age, respectively. In order to test my hypotheses that compensation committee members, rather than the whole board, are the determining factors in deciding CEO compensation level, I also test my regression model using the average age of outside directors. I expect the coefficient of the average age of outside directors to be insignificant, since the compensation committee, rather than the whole board, functions as the determining factor in deciding CEOs' compensation.

CEO characteristics

I control for the employment histories and personal attributes of CEOs that may affect the level of CEO compensation: managerial power, experience, and horizon problem. CEO age, a proxy for experience, and horizon problem, equals the CEO age in years. Tenure, a proxy for managerial power, equals the number of years in the current CEO role. One would expect that CEOs with longer tenure would tend to have more influence over board members, and that older CEOs and CEOs with longer tenure might lead to managerial entrenchment. CEOs with longer tenure and older age might also have more power to design their own compensation packages. Also, I include a dummy variable CEO in NC, which equals 1 if the CEO sits on the nomination committee and 0 otherwise as a robustness test. I expect that the CEO who is also a nomination committee member might have more power to nominate and appoint directors and indeed have more influence on the design of a compensation package that is favourable to themselves. The last indicator variable is a dummy variable, which equals 1 if it is the CEO's first year of service at the firm (CEO First Year) and 0 otherwise.

Corporate governance characteristics

To control the influence of the quality of the board on the level of CEO compensation, I include several board of directors' characteristics. First, I include board size (the total number of directors in the board) (Ozkan, 2007). According to Jenson (1993), Yermack (1996), and Core, Holthausen, and Larcker (1999), the effectiveness of board monitoring is reduced when the number of directors is high, because it is easier for the CEO to capture the board, and create free rider problems among directors. Thus, I expect a positive relationship between CEO compensation and board size, since larger boards tend to be less effective monitors. Second, I include the ratio of outside directors, which equals the percentage of non-executive directors. Outside directors are regarded as more effective monitors since they have a higher reputation cost (Fama and Jenson, 1983). Yermack (1996) and Cyert, Sok-Hyon, and Kumar (2002) find no evidence of relationship between CEO compensation and the ratio of outside directors. In contrast, Core, Holthausen, and Larcker (1999) suggest that independent directors may not always act in the best interests of shareholders due to board capture theory. Last, as discussed before, the attributes of compensation committees play a determining role in designing CEO compensation, so I include variables that comprise the experience and expertise of compensation committee members and capture the structure of the compensation committee. The average tenure of compensation committee members, other current board seats, size of compensation committee, and independent ratio of compensation committee are all included.

Firm controls

Earlier studies (Rosen 1982; Core, Holthausen, and Larcker, 1999) indicate that the demand for managerial talent increases with firm size, growth opportunities, and operational complexity. Accordingly, I use the natural log of total assets as a proxy for firm size and operational complexity of the firm, and the market-to-book ratio as a proxy for firms' growth opportunities. Since managerial talent and ability is difficult to observe and measure, agency theory predicts that the board in general will use specific firm-level performance outcome criteria to decide CEO compensation. In addition, Core, Holthausen, and Larcker (1999) argue that firm risk is a potentially determining factor of CEO compensation level. Thus, I control for firm risk using stock volatility, which is the standard deviation of stock price.

In order to capture firm performance, market- and accounting-based measures of performance are all included. The accounting-based performance measure is return on assets, which is the firms' ROA. The market-based measure is stock return, which is the average of monthly stock return on the common stock. In addition, I employ Tobin's q to capture firm value. I also control for firms' leverage, which is measured as total liabilities over total assets. I use lagged economic explanatory variables to reduce the potential endogeneity problem in my regression model.

Table 3.1 Descriptive Statistics

VARIABLES	(1) N	(2) mean	(3) sd	(6) p25	(7) p50	(8) p75
CEO First Year	3,420	0.173	0.379	0.000	0.000	0.000
CEO Tenure	3,420	5.814	5.633	2.000	4.100	7.400
CEO Age	3,420	51.650	6.291	47.000	52.000	56.000
Board Size	3,420	9.111	2.593	7.000	9.000	10.000
Outsider Ratio	3,420	0.616	0.120	0.545	0.625	0.714
Ln Cash_C	3,413	6.588	0.709	6.174	6.579	7.030
LNTC	3,420	7.212	0.940	6.585	7.164	7.826
CC Size	3,420	3.840	1.070	3.000	4.000	4.000
Age_Comp	3,420	58.710	3.989	56.000	58.920	61.330
Age_Dissimilarity	3,420	8.258	5.503	3.800	7.646	12.000
Independent Ratio In CC	3,420	0.937	0.153	1.000	1.000	1.000
Lag ROA	3,420	5.367	8.736	1.635	5.258	9.222
Average CC Tenure	3,420	3.653	1.952	2.400	3.363	4.500
Busy CC Member	3,420	2.330	0.861	1.750	2.250	2.750
Lag Tobin's q	3,420	1.669	0.903	1.079	1.392	1.927
Lag TA	3,420	7.200	1.847	5.981	6.930	8.104
Lag MB Ratio	3,420	3.033	3.792	1.263	2.117	3.542
Lag Leverage	3,420	0.611	0.211	0.469	0.614	0.755
CEO in NC	3,420	0.368	0.482	0.000	0.000	1.000
Lag Stock Volatility	3,420	37.830	19.20	25.120	32.550	44.230
Lag Stock Return	3,420	0.009	0.0356	-0.009	0.011	0.028
Average Outsider Tenure	3,420	3.646	1.862	2.475	3.320	4.395
Average Outsider Age	3,420	58.670	3.577	56.400	58.750	61.000

See Appendix A.2 for variables' definition.

Summary statistics

Table 3.1 reports summary statistics for CEO compensation, CEO attributes, accounting and market information, and firm-specific variables for FTSE 350 firms. The average (median) age of compensation committee members is 58.710 (58.920). The average (median) tenure of a compensation committee member is 3.653 (3.363). Further, the average (median) current quoted board seats that a compensation committee member has is 2.330 (2.250). The average (median) age of the CEO is 51.650 (52.000), which is about 7 years younger than the average age of a compensation committee member, and the average (median) tenure for the CEO is 5.814(4.100). The mean value of dummy variable CEO in NC is 0.368, suggesting that in my sample around 37% of the CEOs are also members of the nomination committee. Across the sample, about 62% of directors are non-executive directors and 94% of compensation committee members are independent. Finally, the average age and tenure of non-executive directors is 58.670 and 3.646, respectively.

3.5 Results

The effects of age and age similarity on CEO total compensation

Table 3.2 reports the results from my analysis of the relationship between both the age of compensation committee members and the age dissimilarity between the CEO and compensation committee members and CEO compensation. The results from my OLS regression are reported in column (1), column (3), and column (5). Table 3.2 reports the results of the OLS regressions of CEO compensation on the set of director-level, committee-level, and firm-level variables, with specifications examining the average age of compensation committee members (column (1)), the absolute value of the gap between CEO age and the average age of compensation committee members (column (3)), and the average age of outsider directors (column (5)). My results in column (1) suggest that CEO compensation is negatively associated with the age of compensation committee members (Age_Comp_{it}), and is significant at the 1% level. In column (1), I present the results of estimation Equation (3.1) using LNTC as the dependent variable. The coefficient on Age_Comp_{it} is –0.007 and is significant at the 1% level, indicating that the level of CEO compensation is lower when compensation committee members are older. For the mean CEO compensation of 2,171,767 in my sample, the estimated reduction in CEO compensation for an additional year older in the compensation committee is 15,202. In column (3) I report the results on the relationship between CEO compensation and the absolute value of the age dissimilarity between compensation committee members and the CEO. In this pooled cross-sectional analysis, the absolute value of the age dissimilarity between compensation committee members and the CEO ($Age\_Dissimilarity_{it}$) is negatively associated with the level of CEO compensation at the 1% significance level.

In column (5), I regress CEO compensation on the average age of outsider directors, and same set of variables is used to explain CEO compensation to see if there are any potential correlations between the age of outside directors and the level of CEO compensation. In contrast, I do not find a significant relationship between the level of CEO compensation and the age of outsider directors, suggesting that there is no association between the age of general outsider directors and the level of CEO compensation.

To address the endogeneity of the age effect of compensation committee members, I re-estimate firm fixed-effects regressions and report the results in column ((2, (4), and (6) of Table 3.2. Consistent with the OLS results, the coefficients on the average

age of compensation committee members (Age_Comp_{it}) and the absolute value of the age gap between compensation committee members and the CEO ($Age\_Dissimilarity_{it}$) are both negative and significant. Again, the coefficient on the average age of outside directors ($Average\ outsider\ age_{it}$) is not significant.

The adjusted R^2 ranges from 53.9% to 54.1% and 31.1% to 31.2% of the OLS regressions and firm-fixed effects regressions, respectively, indicating the reasonable explanatory power of the models.

The sign and significance on the other determinants of total compensation level are generally consistent with my expectations and the earlier literature (Core, Holthausen, and Larcker, 1999; and Chalmers, Koh, and Stapledon, 2006). The first-time CEO to a company receives a lower total level of CEO compensation, reflecting the firm's lack of knowledge of the ability of the newly appointed CEO. The coefficients on board size, compensation committee size, and outsider ratio are positive and significant for the level of CEO compensation. Also, the coefficient on the average number of other board seats that compensation committee members hold is positively associated with the total level of CEO compensation, suggesting that the business of compensation committee members weakens the effectiveness of corporate governance (Fich and Shivdasani, 2006). Firm size, proxied by the natural log of total assets, has a positive and significant impact on the level of CEO compensation, suggesting that large and complex firms pay their CEOs higher total compensation. The accounting-based measure of firm performance (ROA), does not have any significant impact on CEO compensation. In contrast, I observe that market-based firm performance (stock return) and firm value (Tobin's q ratio) are positive and significantly associated with the level of CEO compensation, consistent with earlier studies (Hartzell and Starks, 2003; Ozkan, 2011). Similar to the previous literature, the leverage ratio has a negative and significant effect on CEO compensation. I also find that the information asymmetry between insiders (CEO) and outsiders (shareholders), measured by the volatility of the stock price (Stock volatility), has a negative and significant impact on the level of CEO compensation.

In all of my specifications, the constant term is most highly significant variable, indicating that a large portion of total CEO compensation is fixed across firms.

Table 3.2 CEO compensation and the age of compensation committee members

This table reports the panel regression results of CEO compensation (LNTC) on the age of compensation committee members (Age_Comp), age dissimilarity between the CEO and compensation committee members (Age_Dissimilarity), and age of outside directors (Average Outsider Age), respectively. All the economic determinants' variables are lagged with respect to compensation. Column (1), Column (3), and Column (5) report the pooled OLS regression results of CEOs' compensation on the age of compensation committee members, age dissimilarity between the CEO and compensation committee members, and age of outside directors, respectively. Column (2), Column (4), and Column (6) report the firm-fixed effects' regression results of CEOs' compensation on the age of compensation committee members, age dissimilarity between CEO and compensation committee members, and age of outside directors, respectively. ***, **, and *indicate two-tailed significance at 1%, 5%, and 10%, respectively.

VARIABLES	(1) LNTC	(2) LNTC	(3) LNTC	(4) LNTC	(5) LNTC	(6) LNTC
Age_Comp	-0.007**	-0.004*				
	(-2.310)	(-2.145)				
Age_Dissimilarity			-0.012***	-0.010***		
			(-3.946)	(-3.765)		
Average Outsider Age					-0.004	-0.003
					(-1.055)	(-0.654)
CEO First Year	-0.247***	-0.235***	-0.243***	-0.231***	-0.246***	-0.234***
	(-5.751)	(-4.776)	(-5.670)	(-4.857)	(-5.714)	(-4.776)
CEO Tenure	0.005	0.006	0.005*	0.005	0.005*	0.006
	(1.574)	(1.351)	(1.663)	(1.320)	(1.695)	(1.486)
Board Size	0.021***	0.015*	0.021***	0.015*	0.020***	0.014
	(2.994)	(2.020)	(3.086)	(2.201)	(2.867)	(1.782)
Outsider Ratio	1.109***	0.242	1.102***	0.211	1.122***	0.209
	(9.245)	(0.774)	(9.207)	(0.689)	(9.296)	(0.697)
CEO Age	-0.002	-0.012***	-0.010***	-0.018***	-0.002	-0.012***
	(-0.776)	(-6.130)	(-3.359)	(-7.750)	(-0.774)	(-5.825)
CC size	0.065***	0.030	0.065***	0.029	0.066***	0.032
	(5.721)	(1.531)	(5.640)	(1.565)	(5.731)	(1.642)
Busy CC Member	0.054***	0.000	0.052***	0.002	0.051***	-0.001
	(3.246)	(0.005)	(3.170)	(0.103)	(3.083)	(-0.070)
Average CC Tenure	-0.011*	-0.001	-0.011	-0.000		
	(-1.683)	(-0.161)	(-1.640)	(-0.044)		
Independent Ratio In CC	-0.006	0.303**	-0.008	0.292**	-0.001	0.309**
	(-0.080)	(2.535)	(-0.111)	(2.458)	(-0.015)	(2.625)
Average Outsider Tenure					-0.015**	-0.011
					(-2.109)	(-1.452)
Lag TA	0.303***	0.172***	0.302***	0.172***	0.302***	0.172***
	(27.032)	(3.911)	(27.005)	(3.908)	(27.016)	(3.831)
Lag ROA	0.001	0.001	0.001	0.002	0.001	0.002
	(0.762)	(0.455)	(0.795)	(0.475)	(0.753)	(0.457)
Lag Tobin’s q	0.153***	0.049**	0.154***	0.050**	0.152***	0.051**
	(7.277)	(2.753)	(7.336)	(3.037)	(7.217)	(2.670)
Lag MB Ratio	-0.003	-0.006***	-0.002	-0.006***	-0.002	-0.006**
	(-0.720)	(-3.309)	(-0.674)	(-3.358)	(-0.583)	(-3.080)
Lag Leverage	-0.288***	-0.075	-0.297***	-0.074	-0.279***	-0.070
	(-4.383)	(-0.834)	(-4.518)	(-0.846)	(-4.256)	(-0.758)
Lag Stock Return	0.831**	0.998*	0.836**	1.004*	0.833**	1.008*
	(1.963)	(1.932)	(1.979)	(1.942)	(1.968)	(1.954)
Lag Stock Volatility	-0.002***	-0.000	-0.002***	-0.000	-0.002***	-0.001
	(-2.732)	(-0.400)	(-2.691)	(-0.390)	(-2.839)	(-0.452)
Constant	4.160***	5.722***	4.268***	5.861***	3.962***	5.681***
	(17.911)	(16.476)	(20.438)	(14.867)	(16.004)	(17.537)
Observations	3,420	3,420	3,420	3,420	3,420	3,420
Adjusted R-squared	0.539	0.311	0.541	0.312	0.539	0.311
Industry dummy	Yes	NO	Yes	NO	Yes	NO
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Firm dummy	NO	Yes	NO	Yes	NO	Yes

The effects of age and age dissimilarity on CEO cash compensation

Table 3.3 provides the regression results for Equation (3.1) using the natural log of CEO cash compensation as the dependent variable. CEO cash compensation is measured as the per-year sum of salary and bonus from Boardex.

Column (1), column (3), and column (5) report the OLS regression results of CEO cash compensation on my set of director-level, committee-level, and firm-level variables, with specifications examining the average age of compensation committee members (column (1)), absolute value of age dissimilarity between the CEO and compensation committee members (column (3)), and average age of outsider directors (column (5)). Consistent with my conjecture, I find that the coefficients on both the age of compensation committee members and the absolute value of age dissimilarity between compensation committee members and the CEO are negatively correlated with CEO cash compensation. The economic magnitudes of the coefficients on the average age of compensation committee members and the absolute value of the age gap between compensation committee members are significant as well. On the other hand, the coefficient on the average age of non-executive directors is not significant. I further test Equation (3.1) by employing a firm-fixed effect model, in order to address any omitted-variables bias. Column (2), column (4), and column (6) provide the firm-fixed effect regression results, and I can see that my main results remain intact. It is worthy of note that the accounting-based measure of firm performance is positively and significantly associated with CEO cash compensation, consistent with the earlier literature that CEO base salary and bonus are more dependent on accounting-based firm performance. Furthermore, I report that the information asymmetry between insiders (CEO) and outsiders (shareholders), measured by the volatility of the stock price (Stock volatility), has no impact on CEO cash compensation.

Table 3.3 CEO cash compensation and the age of compensation committee members

This table reports the panel regression results of CEO cash compensation (LN Cash_C) on the age of compensation committee members (Age_Comp), age dissimilarity between the CEO and compensation committee members (Age_Dissimilarity), and age of outside directors (Average Outsider Age), respectively. All the economic determinants' variables are lagged with respect to compensation. Column (1), column (3), and column (5) report the pooled OLS regression results of CEOs' cash compensation on the age of compensation committee members, age dissimilarity between the CEO and compensation committee members, and age of outside directors, respectively. Column (2), column(4), and column(6) report the firm-fixed effects' regression results of CEOs' cash compensation on the age of compensation committee members, age dissimilarity between the CEO and compensation committee members, and age of outside directors, respectively. ***, **, and *indicate two-tailed significance at 1%, 5%, and 10%, respectively.

VARIABLES	(1) LN Cash_C	(2) LN Cash_C	(3) LN Cash_C	(4) LN Cash_C	(5) LN Cash_C	(6) LN Cash_C
Age_Comp	-0.005*	-0.005**				
	(-1.861)	(-2.835)				
Age_Dissimilarity			-0.008***	-0.009*		
			(-3.500)	(-2.131)		
Average Outsider Age					0.000	0.002
					(0.100)	(0.565)
CEO First Year	-0.377***	-0.367***	-0.374***	-0.363***	-0.377***	-0.368***
	(-10.104)	(-7.975)	(-10.052)	(-8.180)	(-10.068)	(-8.159)
CEO Tenure	0.005**	0.005	0.005**	0.005	0.005**	0.005
	(2.194)	(1.562)	(2.261)	(1.528)	(2.255)	(1.661)
CEO Age	0.004**	-0.003	-0.002	-0.008*	0.004**	-0.003
	(2.442)	(-1.443)	(-0.822)	(-2.062)	(2.289)	(-1.434)
Board Size	0.018***	0.011	0.019***	0.011	0.018***	0.010
	(3.122)	(0.930)	(3.198)	(0.967)	(2.973)	(0.861)
Outsider Ratio	0.935***	0.564*	0.930***	0.536*	0.944***	0.555**
	(9.912)	(2.248)	(9.901)	(2.224)	(10.041)	(2.290)
CC size	0.027***	0.009	0.027***	0.009	0.028***	0.010
	(3.173)	(0.663)	(3.107)	(0.637)	(3.215)	(0.711)
Busy CC Member	0.035***	0.007	0.034**	0.008	0.032**	0.005
	(2.636)	(0.402)	(2.572)	(0.480)	(2.423)	(0.294)
Average CC Tenure	-0.007	0.002	-0.006	0.002		
	(-1.340)	(0.465)	(-1.291)	(0.533)		
Independent Ratio In CC	-0.055	0.237***	-0.057	0.230***	-0.044	0.246***
	(-0.850)	(5.634)	(-0.873)	(5.263)	(-0.686)	(5.836)
Average Outsider Tenure					-0.008	-0.006
					(-1.458)	(-0.863)
Lag TA	0.204***	0.124***	0.203***	0.124***	0.204***	0.122***
	(24.506)	(4.152)	(24.476)	(4.191)	(24.498)	(4.115)
Lag ROA	0.004***	0.001	0.004***	0.001	0.004***	0.001
	(3.131)	(0.517)	(3.166)	(0.539)	(3.077)	(0.454)
Lag Tobin’s q	0.064***	0.021	0.064***	0.022	0.064***	0.021
	(4.386)	(1.613)	(4.425)	(1.631)	(4.352)	(1.568)
Lag MB Ratio	0.002	-0.002	0.002	-0.001	0.002	-0.001
	(0.624)	(-0.409)	(0.671)	(-0.390)	(0.731)	(-0.386)
Lag leverage	-0.165***	-0.023	-0.172***	-0.021	-0.157***	-0.016
	(-3.316)	(-0.253)	(-3.440)	(-0.225)	(-3.162)	(-0.183)
Lag Stock Return	1.098***	1.355**	1.102***	1.362**	1.097***	1.370**
	(3.373)	(2.673)	(3.383)	(2.698)	(3.371)	(2.742)
Lag Stock Volatility	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.656)	(-0.020)	(-0.615)	(-0.008)	(-0.718)	(-0.039)
Constant	4.283***	5.303***	4.368***	5.362***	3.999***	4.934***
	(24.320)	(20.182)	(28.545)	(22.085)	(20.996)	(16.372)
Observations	3,413	3,413	3,413	3,413	3,413	3,413
Adjusted R-squared	0.483	0.264	0.485	0.266	0.482	0.264
Industry dummy	Yes	NO	Yes	Yes	Yes	NO
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Firm dummy	NO	Yes	NO	NO	NO	Yes

The effects of age and age dissimilarity on CEO excess compensation

$$Excess\_comp_{it} = \beta_0 + \beta_1 Age\_Comp_{it}(Age\_Dissimiarlity_{it}) +$$
$$\sum \beta_j \; Corporate\ Governance\ Characteristics_{it} + \sum \beta_K \; CEO\ Characteristics_{it} +$$
$$\text{year\_dummy} + \text{industry\_dummy} + \varepsilon_{it} \qquad (3.2)$$

Overall, the evidence provided so far indicates the effects of age and age dissimilarity on the level of CEO total compensation and cash compensation. Following Croci, Gonenc, and Ozkan (2012) and Ertimur, Ferri, and Muslu (2010), I split CEO total pay into two components: a predicted component based on economic determinants and a residual component which is called “excess compensation.” CEO predicted pay aims to capture the level of “expected” CEO total compensation determined by economic determinants. Excess CEO pay, measured as the difference between actual CEO pay and predicted CEO pay derived from standard economic determinants, is regarded as a sign of poor governance (e.g., Core, Holthausen, and Larcker 1999). Here, based on my hypotheses that older compensation committee members and a larger age gap between the CEO and compensation committee members may enhance monitoring intensity, which is sign of good governance, I suggest that both the age of compensation committee members and the age gap between the CEO and compensation committee members are negatively associated with CEO excess pay. In order to test my hypotheses, I regress excess CEO pay on board and compensation committee structure and characteristics’ variables. Table 3.4 reports the results of regression of excess CEO compensation on board and compensation committee variables. Column (1) reports the regression of excess CEO pay on the age of compensation committee members, as well as on some other board and compensation committee variables. My results show that the age of compensation committee members is negatively and significantly correlated with excess CEO pay. Column (3) reports the regression of excess CEO pay on the age dissimilarity between the CEO and compensation committee members, as well as on some other board and compensation committee variables. The coefficient on age dissimilarity between the CEO and compensation committee members is negative and significant. I interpret this evidence as consistent with the view that an older compensation committee and a greater age dissimilarity between the CEO and compensation committee members enhances monitoring intensity and corporate governance. Again, I do not find a significant relationship between excess CEO pay and the age of outside directors. Column (2), column (4), and column (6) re-estimate Equation (3.2) by employing firm-fixed effects, and my main results remain intact.

Table 3.4 Excess total compensations and age of compensation committee members

This table reports the estimates of the OLS regressions for the excess total compensations (excess_TC) on age of compensation committee members (Age_Comp), age dissimilarity between the CEO and compensation committee members (Age_Dissimilarity), and age of outside directors (Average Outsider Age), respectively. Excess total compensation is the actual compensation minus the predicted value. To estimate the predicted compensation, I run these regressions of total compensation on economical determinants controlling for year and industry fixed effects. All the economic determinants' variables are lagged with respect to compensation. Column (1), column (3), and column (5) report the pooled OLS regression results of CEOs' excess total compensation on the age of compensation committee members, age dissimilarity between the CEO and compensation committee members, and age of outside directors, respectively. Column (2), column (4), and column (6) report the firm-fixed effects regression results of CEOs' excess total compensation on the age of compensation committee members, age dissimilarity between the CEO and compensation committee members, and age of outside directors, respectively. ***, **, and *indicate two-tailed significance at 1%, 5%, and 10%, respectively.

VARIABLES	(1) excess_TC	(2) excess_TC	(3) excess_TC	(4) excess_TC	(5) excess_TC	(6) excess_TC
Age_Comp	-0.006**	-0.006**				
	(-2.060)	(-2.619)				
Age_Dissimilarity			-0.011***	-0.011***		
			(-3.564)	(-4.906)		
Average Outsider Age					-0.004	-0.006
					(-1.178)	(-1.304)
CEO First Year	-0.250***	-0.251***	-0.246***	-0.246***	-0.249***	-0.250***
	(-5.753)	(-5.157)	(-5.683)	(-5.231)	(-5.710)	(-5.118)
CEO Tenure	0.006**	0.003	0.006**	0.002	0.006**	0.003
	(1.963)	(1.008)	(2.075)	(0.915)	(2.021)	(1.203)
CEO Age	-0.003	-0.014***	-0.010***	-0.021***	-0.003	-0.014***
	(-1.270)	(-8.103)	(-3.408)	(-9.657)	(-1.228)	(-7.198)
Board Size	-0.002	-0.001	-0.002	-0.000	-0.003	-0.002
	(-0.335)	(-0.088)	(-0.332)	(-0.027)	(-0.505)	(-0.307)
Outsider Ratio	0.873***	0.224	0.861***	0.189	0.883***	0.179
	(7.861)	(0.682)	(7.755)	(0.580)	(7.918)	(0.580)
CC Size	0.059***	0.025	0.059***	0.024	0.060***	0.027
	(5.189)	(1.133)	(5.103)	(1.145)	(5.222)	(1.286)
Busy CC Member	0.036**	-0.007	0.034**	-0.005	0.034**	-0.008
	(2.111)	(-0.445)	(2.020)	(-0.369)	(1.993)	(-0.584)
Average CC Tenure	-0.012*	-0.004	-0.012*	-0.004		
	(-1.810)	(-0.367)	(-1.764)	(-0.315)		
Independent Ratio In CC	-0.051	0.181	-0.053	0.171	-0.044	0.192*
	(-0.712)	(1.748)	(-0.742)	(1.679)	(-0.625)	(1.911)
Average Outsider Tenure					-0.013*	-0.014
					(-1.889)	(-1.531)
Constant	0.038	0.903**	0.143	0.992***	-0.111	0.934**
	(0.165)	(3.209)	(0.698)	(3.403)	(-0.454)	(3.193)
Observations	3,420	3,420	3,420	3,420	3,420	3,420
Adjusted R-squared	0.052	0.033	0.055	0.036	0.051	0.035
Industry dummy	Yes	NO	Yes	NO	Yes	NO
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Firm dummy	NO	Yes	NO	Yes	NO	Yes

The effects of age and age dissimilarity on CEO excess cash compensation

I also examine how age and age dissimilarity impact excess CEO cash compensation, and provide the results in Table 3.5. The results are consistent with my prediction that both the age of compensation committee members and the age dissimilarity between the CEO and compensation committee members have negative impacts on excess CEO cash compensation. On the other hand, the age of outside directors has no significant impact on excess CEO compensation. The control variables in Table 5 that are significant in the models are in line with the findings of the earlier literature (Chalmers, Koh, and Stapledon, 2006; Core, Holthausen, and Larcker, 1999).

Table 3.5 Excess cash compensations and age of compensation committee members

This table reports the estimates of the OLS regressions for the excess cash compensations (excess_cash) on the age of compensation committee members (Age_Comp), age dissimilarity between the CEO and compensation committee members (Age_Dissimilarity), and age of outside directors (Average Outsider Age), respectively. Excess total compensation is the actual cash compensation minus the predicted value. To estimate the predicted compensation, I run these regressions of total cash compensation on economical determinants controlling for year and industry fixed effects. All the economic determinants' variables are lagged with respect to compensation. Column (1), column (3), and column (5) report the pooled OLS regression results of CEOs' excess cash compensation on the age of compensation committee members, age dissimilarity between the CEO and compensation committee members, and age of outside directors, respectively. Column (2), column (4), and column (6) report the firm-fixed effects' regression results of CEOs' excess cash compensation on the age of compensation committee members, age dissimilarity between the CEO and compensation committee members, and age of outside directors, respectively. ***, **, and *indicate two-tailed significance at 1%, 5%, and 10%, respectively.

VARIABLES	(1) excess_ cash	(2) excess_ cash	(3) excess_ cash	(4) excess_ cash	(5) excess_ cash	(6) excess_ cash
Age_Comp	-0.004*	-0.007***				
	(-1.678)	(-4.492)				
Age_Dissimilarity			-0.008***	-0.010**		
			(-3.154)	(-2.747)		
Average Outsider Age					-0.000	-0.001
					(-0.058)	(-0.219)
CEO First Year	-0.378***	-0.376***	-0.375***	-0.372***	-0.377***	-0.376***
	(-9.987)	(-8.399)	(-9.940)	(-8.587)	(-9.948)	(-8.544)
CEO Tenure	0.005**	0.003	0.006***	0.003	0.005**	0.003
	(2.535)	(1.473)	(2.623)	(1.401)	(2.528)	(1.610)
CEO Age	0.003*	-0.004*	-0.002	-0.010**	0.003*	-0.004*
	(1.908)	(-2.196)	(-0.959)	(-2.946)	(1.797)	(-2.034)
Board Size	0.002	0.001	0.002	0.002	0.001	0.001
	(0.413)	(0.100)	(0.415)	(0.126)	(0.213)	(0.040)
Outsider Ratio	0.760***	0.555*	0.752***	0.523*	0.767***	0.537*
	(8.534)	(2.092)	(8.468)	(2.032)	(8.643)	(2.126)
CC Size	0.023***	0.006	0.023**	0.005	0.024***	0.007
	(2.633)	(0.330)	(2.564)	(0.301)	(2.688)	(0.409)
Busy CC Member	0.021	0.002	0.020	0.003	0.019	0.000
	(1.593)	(0.146)	(1.517)	(0.199)	(1.425)	(0.004)
Average CC Tenure	-0.008	0.001	-0.007	0.000		
	(-1.528)	(0.176)	(-1.483)	(0.080)		
Independent Ratio In CC	-0.091	0.152***	-0.093	0.145**	-0.078	0.162***
	(-1.366)	(3.367)	(-1.387)	(3.202)	(-1.195)	(3.372)
Average Outsider Tenure					-0.007	-0.008
					(-1.318)	(-1.128)
Constant	-0.102	0.407*	-0.021	0.417	-0.348*	0.088
	(-0.594)	(1.935)	(-0.138)	(1.795)	(-1.841)	(0.289)
Observations	3,413	3,413	3,413	3,413	3,413	3,413
Adjusted R-squared	0.090	0.090	0.093	0.093	0.089	0.089
Industry dummy	Yes		Yes		Yes	
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Firm dummy		Yes		Yes		Yes

3.6 Robustness test

Propensity score matching

A possible concern with the results reported in Tables 3.2–3.5 is a potential self-selection bias. That is, there are substantial differences between firms with older compensation committee members and those with younger compensation committee members, and it is these differences which induce the lower level of total CEO compensation, CEO cash compensation, excess CEO compensation, and excess CEO cash compensation. To examine whether this is the case, older compensation committee members and younger compensation committee members should be assigned to exactly the same firm and differ only in age of compensation committee members, then any differences in CEO pay can be attributed to the age of compensation committee members.

However, as my setting is one which I have hypothesized a relationship between the age of compensation committee members and CEO pay, a PSM procedure is appropriate to assess the robustness of my regression findings (Dehejia and Wahba, 2002; Rosenbaum and Rubin, 1983). The procedure works as follows. I first eliminate any observations from my main sample in which the age of compensation committee members is younger than the oldest 25% and older than the youngest 25%. Second, using a probit model, I regress older compensation committee members (dummy variable coded 1 if the age of compensation committee members is greater than the median) on the previously used control variables and estimate the probability (i.e., the propensity score) that a firm has older compensation committee members. Third, each observation in which the compensation committee member is in the oldest age quantile is matched to an observation in which the compensation committee member is in the youngest age quantile and has the closest propensity score, without replacement, requiring propensity scores for each matched pair be within –5% to 5% of each other. The resulting total CEO pay sample consists of 880 firm–year observations and the CEO cash pay sample consists of 878 firm–year observations.

Table 3.6 and Table 3.7 present the regression results of my PSM analysis, in a specification of the age of compensation committee members and age dissimilarity between the CEO and compensation committee members, respectively. My overall set of results from PSM generally support my OLS findings. They show that for the regression on CEO total pay and excess CEO total pay, the coefficients on both the age of compensation committee members and age dissimilarity between the CEO and compensation committee members are negative and significant. These suggest that my key inferences are robust to different specifications.

However, for CEO cash pay and excess cash pay, my findings from PSM show insignificant findings on the age of compensation committee members and significant negative results on the age dissimilarity between the CEO and compensation committee members compared to my OLS estimations. These differences raise some questions about the robustness of my earlier findings on the age of compensation committee members, which might be reduced by a reduction in my sample size.

In summary, the findings in Table 3.6 and Table 3.7 suggests that CEO total compensation is determined by the economic determinants of the firm as well as by some other board and governance variables, including the age of compensation committee members and the age dissimilarity between the CEO and compensation committee members.

Table 3.6 Endogeneity test (CEO total compensation)

PSM sample analysis of both CEO total compensation and excess CEO total compensation and the age of compensation committee members, age dissimilarity between the CEO and compensation committee members, and age of outside directors. The ages of compensation committee members are determined and grouped in quantiles. The younger compensation committee is the group of compensation committees in the youngest age quantile. The older compensation committee is the group of compensation committees in the oldest age quantile. All the economic determinants' variables are lagged with respect to compensation. Column (1), column (2), and column (3) report the pooled OLS regression results of CEOs' total compensation on the age of compensation committee members, age dissimilarity between the CEO and compensation committee members, and age of outside directors, respectively. Column (4), column (5), and column (6) report the pooled OLS regression results of CEOs' excess total compensation on the age of compensation committee members, age dissimilarity between the CEO and compensation committee members, and age of outside directors, respectively. ***, **, and *indicate two-tailed significance at 1%, 5%, and 10%, respectively.

VARIABLES	(1) LNTC	(2) LNTC	(3) LNTC	(4) excess_ TC	(5) excess_ TC	(6) excess_ TC
Age_Comp	-0.007*			-0.007*		
	(-1.775)			(-1.686)		
Age_Dissimilarity		-0.009**			-0.009**	
		(-1.993)			(-1.983)	
Average Outsider Age			-0.004			-0.004
			(-0.780)			(-0.750)
CEO First Year	-0.142*	-0.145*	-0.140*	-0.145*	-0.147**	-0.142*
	(-1.912)	(-1.952)	(-1.877)	(-1.936)	(-1.976)	(-1.899)
CEO Tenure	0.003	0.003	0.003	0.004	0.004	0.004
	(0.668)	(0.699)	(0.679)	(0.877)	(0.910)	(0.865)
CEO Age	-0.004	-0.010**	-0.004	-0.004	-0.010**	-0.004
	(-1.066)	(-2.039)	(-1.068)	(-1.152)	(-2.091)	(-1.145)
Board Size	0.011	0.011	0.011	-0.001	-0.001	-0.001
	(0.868)	(0.873)	(0.825)	(-0.095)	(-0.058)	(-0.103)
Outsider Ratio	0.487**	0.479**	0.471**	0.349*	0.345*	0.341
	(2.118)	(2.075)	(2.022)	(1.675)	(1.648)	(1.625)
CC Size	0.068***	0.067***	0.068***	0.064***	0.063***	0.064***
	(3.062)	(3.007)	(3.072)	(2.940)	(2.889)	(2.949)
Busy CC Member	0.027	0.023	0.028	0.018	0.014	0.019
	(1.056)	(0.905)	(1.100)	(0.725)	(0.579)	(0.780)
Average CC Tenure	0.002	0.001		0.000	-0.000	
	(0.114)	(0.088)		(0.013)	(-0.012)	
Independent Ratio In CC	0.107	0.095	0.107	0.068	0.059	0.069
	(0.804)	(0.710)	(0.824)	(0.511)	(0.439)	(0.535)
Average Outsider Tenure			0.004			0.003
			(0.252)			(0.199)
Lag TA	0.317***	0.318***	0.318***			
	(15.213)	(15.489)	(15.218)			
Lag ROA	-0.000	-0.000	-0.000			
	(-0.071)	(-0.016)	(-0.068)			
Lag Tobin’s q	0.126***	0.127***	0.125***			
	(3.396)	(3.426)	(3.366)			
Lag MB Ratio	-0.001	-0.001	-0.001			
	(-0.225)	(-0.191)	(-0.154)			
Lag Leverage	0.009	0.003	0.014			
	(0.081)	(0.027)	(0.115)			
Lag Stock Return	2.171***	2.145***	2.156***			
	(2.906)	(2.886)	(2.884)			
Lag Stock Volatility	-0.002	-0.002	-0.002			
	(-1.147)	(-1.118)	(-1.079)			
Constant	4.652***	4.612***	4.432***	0.170	0.153	-0.040
	(11.277)	(11.355)	(10.317)	(0.425)	(0.390)	(-0.096)
Observations	880	880	880	880	880	880

Adjusted R-squared	0.520	0.520	0.518	0.001	0.003	-0.002
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes

Table 3.7 Endogeneity test (CEO cash compensation)

PSM sample analysis of both CEO total cash compensation and excess CEO cash compensation and the age of compensation committee members, age dissimilarity between the CEO and compensation committee members, and age of outside directors. The age of compensation committee members are determined and grouped in quantiles. The younger compensation committee is the group of compensation committees in the youngest age quantile. The older compensation committee is the group of compensation committees in the oldest age quantile. All the economic determinants' variables are lagged with respect to compensation. Column (1), column (2), and column (3) report the pooled OLS regression results of CEOs' cash compensation on the age of compensation committee members, age dissimilarity between the CEO and compensation committee members, and age of outside directors, respectively. Column (4), column (5), and column (6) report the pooled OLS regression results of CEOs' excess cash compensation on the age of compensation committee members, age dissimilarity between the CEO and compensation committee members, and age of outside directors, respectively. ***, **, and *indicate two-tailed significance at 1%, 5%, and 10%, respectively.

VARIABLES	(1) Ln Cash_C	(2) Ln Cash_C	(3) Ln Cash_C	(4) excess_ cash	(5) excess_ cash	(6) excess_ cash
Age_Comp	-0.003			-0.003		
	(-0.957)			(-0.907)		
Age_Dissimilarity		-0.006*			-0.007*	
		(-1.827)			(-1.861)	
Average Outsider Age			0.002			0.002
			(0.586)			(0.548)
CEO First Year	-0.336***	-0.338***	-0.331***	-0.334***	-0.337***	-0.329***
	(-5.601)	(-5.639)	(-5.526)	(-5.563)	(-5.600)	(-5.486)
CEO Tenure	0.002	0.002	0.002	0.003	0.003	0.003
	(0.643)	(0.640)	(0.593)	(0.893)	(0.898)	(0.808)
Board Size	0.016	0.016	0.015	0.005	0.005	0.004
	(1.540)	(1.553)	(1.459)	(0.534)	(0.561)	(0.439)
Outsider Ratio	0.610***	0.607***	0.599***	0.486***	0.483***	0.481***
	(3.670)	(3.660)	(3.576)	(3.193)	(3.177)	(3.137)
CEO Age	0.004	0.000	0.004	0.004	-0.000	0.004
	(1.635)	(0.102)	(1.646)	(1.520)	(-0.019)	(1.536)
CC size	0.039**	0.038**	0.039**	0.035**	0.034**	0.036**
	(2.350)	(2.296)	(2.416)	(2.177)	(2.128)	(2.223)
Busy CC Member	0.006	0.003	0.011	-0.002	-0.005	0.003
	(0.290)	(0.135)	(0.554)	(-0.127)	(-0.282)	(0.138)
Average CC Tenure	-0.008	-0.008		-0.009	-0.009	
	(-0.700)	(-0.703)		(-0.825)	(-0.830)	

Independent Ratio In CC	0.096	0.086	0.122	0.054	0.047	0.081
	(0.622)	(0.560)	(0.815)	(0.352)	(0.305)	(0.542)
Average Outsider Tenure			0.005			0.004
			(0.532)			(0.464)
Lag TA	0.199***	0.200***	0.200***			
	(13.032)	(13.180)	(13.064)			
Lag ROA	0.006**	0.006**	0.006**			
	(2.214)	(2.277)	(2.169)			
Lag Tobin's q	0.042	0.043	0.042			
	(1.332)	(1.357)	(1.314)			
Lag MB Ratio	-0.000	-0.000	0.000			
	(-0.047)	(-0.059)	(0.022)			
Lag Leverage	-0.022	-0.030	-0.019			
	(-0.250)	(-0.334)	(-0.211)			
Lag Stock Return	1.046*	1.034*	1.041*			
	(1.746)	(1.724)	(1.745)			
Lag Stock Volatility	-0.001	-0.001	-0.000			
	(-0.599)	(-0.581)	(-0.381)			
Constant	4.450***	4.539***	4.035***	-0.242	-0.138	-0.626*
	(13.307)	(14.129)	(11.790)	(-0.775)	(-0.458)	(-1.928)
Observations	878	878	878	878	878	878
Adjusted R-squared	0.462	0.464	0.462	0.062	0.066	0.061
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes

3.7 Sensitivity test

In order to ascertain the robustness of the models, I employ a sensitivity test. A recent argument regarding the design of compensation contracts is that CEOs often have the power to influence who will sit on the board, and the directors may be afraid to challenge them (Bebchuk and Fried, 2003). In addition, these reasons suggest that CEOs have substantial influence over their own pay. To examine this argument, I test whether my finding still holds when CEOs have greater power. I use a dummy variable that equals 1 if the CEO sits on the nomination committee and 0 otherwise to capture CEO power. I use whether CEOs sit on nomination committees to capture CEO power because the nomination committee members' main duty is to find and nominate qualified directors for the board. Table 3.8 and Table 3.9 show the results of OLS regressions after including the CEO power variable for total CEO pay and excess CEO pay and total CEO cash pay and excess CEO cash pay, respectively. The coefficients on CEO power are positively and significantly associated with CEO pay, excess CEO pay, CEO cash pay, and excess CEO cash pay, suggesting that executives with greater power favorably influence their own compensation. Again, the results remain largely stable, with negative associations between the age of compensation committee members and total CEO pay, CEO cash pay, and excess CEO pay, and the age dissimilarity between CEO and compensation committee members and total CEO pay, CEO cash pay, excess CEO pay, and excess CEO cash pay. The association between the age of compensation committee members and excess CEO cash pay, however, become insignificant.

In sum, I re-estimate my models after including the CEO power variable that may influence the level and structure of CEO compensation, and my results remain essentially the same.

Table 3.8 Sensitivity Test (CEO total compensation)

This table reports the panel regression results of both CEO total compensation and excess CEO total compensation and the age of compensation committee members, age dissimilarity between the CEO and compensation committee members, and age of outside directors, controlling for the CEO power variable. All the economic determinants' variables are lagged with respect to compensation. Column (1), column (2), and column (3) report the pooled OLS regression results of CEOs' total compensation on the age of compensation committee members, age dissimilarity between the CEO and compensation committee members, and age of outside directors, respectively. Column (4), column (5), and column (6) report the pooled OLS regression results of CEOs' excess total compensation on the age of compensation committee members, age dissimilarity between the CEO and compensation committee members, and age of outside directors, respectively. ***, **, and *indicate two-tailed significance at 1%, 5%, and 10%, respectively.

VARIABLES	(1) LNTC	(2) LNTC	(3) LNTC	(4) excess_ TC	(5) excess_ TC	(6) excess_ TC
Age_Comp	-0.006**			-0.006*		
	(-2.083)			(-1.857)		
Age_Dissimilarity		-0.012***			-0.011***	
		(-3.860)			(-3.473)	
Average Outsider Age			-0.003			-0.004
			(-0.928)			(-1.071)
CEO First year	-0.244***	-0.240***	-0.243***	-0.247***	-0.244***	-0.246***
	(-5.704)	(-5.624)	(-5.667)	(-5.711)	(-5.642)	(-5.667)
CEO Tenure	0.004	0.005	0.005	0.006*	0.006**	0.006**
	(1.530)	(1.606)	(1.639)	(1.942)	(2.042)	(1.989)
CEO Age	-0.002	-0.010***	-0.002	-0.003	-0.010***	-0.003
	(-0.942)	(-3.398)	(-0.943)	(-1.429)	(-3.442)	(-1.390)
Board Size	0.021***	0.022***	0.021***	-0.002	-0.001	-0.002
	(3.100)	(3.204)	(2.990)	(-0.287)	(-0.274)	(-0.447)
Outsider Ratio	1.133***	1.126***	1.147***	0.889***	0.878***	0.900***
	(9.367)	(9.333)	(9.434)	(7.973)	(7.869)	(8.040)
CEO Age	-0.002	-0.010***	-0.002	-0.003	-0.010***	-0.003
	(-0.942)	(-3.398)	(-0.943)	(-1.429)	(-3.442)	(-1.390)
CC size	0.063***	0.063***	0.064***	0.058***	0.057***	0.058***
	(5.545)	(5.461)	(5.544)	(5.024)	(4.936)	(5.046)
Busy CC Member	0.053***	0.052***	0.051***	0.035**	0.034**	0.033**
	(3.243)	(3.188)	(3.092)	(2.090)	(2.016)	(1.981)
Average CC Tenure	-0.012*	-0.011		-0.013*	-0.012*	
	(-1.704)	(-1.604)		(-1.824)	(-1.730)	
Independent Ratio In CC	-0.006	-0.008	-0.001	-0.051	-0.054	-0.044
	(-0.085)	(-0.117)	(-0.014)	(-0.727)	(-0.757)	(-0.635)
Average Outsider Tenure			-0.015**			-0.013*
			(-2.086)			(-1.858)
Lag TA	0.302***	0.301***	0.301***			
	(26.853)	(26.814)	(26.826)			
Lag ROA	0.001	0.001	0.001			
	(0.757)	(0.797)	(0.752)			
Lag Tobin's q	0.153***	0.154***	0.152***			
	(7.268)	(7.320)	(7.207)			
Lag MB Ratio	-0.002	-0.002	-0.002			
	(-0.595)	(-0.550)	(-0.460)			
Lag Leverage	-0.294***	-0.304***	-0.286***			
	(-4.492)	(-4.635)	(-4.377)			
Lag Stock Return	0.822*	0.828*	0.825*			
	(1.941)	(1.957)	(1.946)			
Lag Stock Volatility	-0.002***	-0.002***	-0.002***			
	(-2.669)	(-2.623)	(-2.768)			
CEO in NC	0.062***	0.063***	0.065***	0.054**	0.055**	0.057**
	(2.698)	(2.760)	(2.822)	(2.383)	(2.415)	(2.488)
Constant	4.095***	4.229***	3.908***	-0.019	0.110	-0.155
	(17.607)	(20.186)	(15.801)	(-0.081)	(0.534)	(-0.636)
Observations	3,420	3,420	3,420	3,420	3,420	3,420

Adjusted R-squared	0.540	0.542	0.539	0.053	0.056	0.052
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes

Table 3.9 Sensitivity test (CEO cash compensation)

This table reports the panel regression results of both CEO cash compensation and excess CEO cash compensation and the age of compensation committee members, age dissimilarity between the CEO and compensation committee members, and age of outside directors, controlling for the CEO power variable. All the economic determinants' variables are lagged with respect to compensation. Column (1), column (2), and column (3) report the pooled OLS regression results of CEOs' cash compensation on the age of compensation committee members, age dissimilarity between the CEO and compensation committee members, and age of outside directors, respectively. Column (4), column (5), and column (6) report the pooled OLS regression results of CEOs' excess cash compensation on the age of compensation committee members, age dissimilarity between the CEO and compensation committee members, and age of outside directors, respectively. ***, **, and *indicate two-tailed significance at 1%, 5%, and 10%, respectively.

VARIABLES	(1) Ln Cash_C	(2) Ln Cash_C	(3) Ln Cash_C	(4) excess_ cash	(5) excess_ cash	(6) excess_ cash
Age_Comp	-0.004*			-0.004		
	(-1.658)			(-1.498)		
Age_Dissimilarity		-0.008***			-0.007***	
		(-3.416)			(-3.068)	
Average Outsider Age			0.001			0.000
			(0.222)			(0.045)
CEO First Year	-0.375***	-0.372***	-0.374***	-0.376***	-0.373***	-0.375***
	(-10.106)	(-10.055)	(-10.070)	(-9.989)	(-9.944)	(-9.950)
CEO Tenure	0.005**	0.005**	0.005**	0.005**	0.005***	0.005**
	(2.153)	(2.208)	(2.201)	(2.516)	(2.594)	(2.498)
CEO Age	0.004**	-0.002	0.003**	0.003*	-0.002	0.003
	(2.278)	(-0.866)	(2.119)	(1.758)	(-0.996)	(1.640)
Board Size	0.019***	0.020***	0.018***	0.002	0.002	0.001
	(3.203)	(3.288)	(3.071)	(0.456)	(0.465)	(0.266)
Outsider Ratio	0.951***	0.947***	0.962***	0.771***	0.764***	0.780***
	(10.026)	(10.016)	(10.172)	(8.642)	(8.574)	(8.762)
CC size	0.026***	0.026***	0.026***	0.022**	0.021**	0.022**
	(2.999)	(2.929)	(3.025)	(2.474)	(2.403)	(2.514)
Busy CC Member	0.034***	0.034***	0.032**	0.021	0.020	0.019
	(2.630)	(2.583)	(2.427)	(1.572)	(1.511)	(1.412)
Average CC Tenure	-0.007	-0.006		-0.008	-0.007	
	(-1.360)	(-1.258)		(-1.541)	(-1.452)	
Independent Ratio In CC	-0.055	-0.057	-0.043	-0.092	-0.093	-0.079
	(-0.855)	(-0.879)	(-0.686)	(-1.378)	(-1.399)	(-1.204)
Average Outsider Tenure			-0.008			-0.007
			(-1.434)			(-1.286)
Lag TA	0.203***	0.202***	0.203***			

	(24.272)	(24.233)	(24.250)			
Lag ROA	0.004***	0.004***	0.004***			
	(3.124)	(3.165)	(3.073)			
Lag Tobin's q	0.064***	0.064***	0.064***			
	(4.392)	(4.425)	(4.360)			
Lag MB Ratio	0.002	0.002	0.002			
	(0.733)	(0.776)	(0.841)			
Lag Leverage	-0.170***	-0.177***	-0.163***			
	(-3.413)	(-3.544)	(-3.273)			
Lag Stock Return	1.090***	1.094***	1.089***			
	(3.350)	(3.361)	(3.347)			
Lag Stock Volatility	-0.000	-0.000	-0.000			
	(-0.604)	(-0.561)	(-0.659)			
CEO in NC	0.044**	0.045**	0.047***	0.039**	0.039**	0.041**
	(2.530)	(2.577)	(2.707)	(2.231)	(2.251)	(2.391)
Constant	4.236***	4.341***	3.960***	-0.143	-0.044	-0.380**
	(24.169)	(28.374)	(20.915)	(-0.831)	(-0.296)	(-2.023)
Observations	3,413	3,413	3,413	3,413	3,413	3,413
Adjusted R-squared	0.484	0.485	0.483	0.091	0.093	0.090
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes

3.8 Conclusion

My study focuses on the age effects and age dissimilarity effects, and how they affect compensation committees' monitoring intensity proxied by CEO total compensation level, CEO cash compensation, excess total compensation, and excess cash compensation. I posit that older compensation committee members exhibit a higher-level ethical standard and are more committed to their responsibility, which is scrutinizing the level of CEOs' compensation. In addition, I hypothesize that the greater age dissimilarity between the CEO and compensation committee members induces cognitive conflicts between the CEO and compensation committee members, which results in more intensive monitoring from compensation committee members. To test my hypotheses, I perform regressions of CEO compensation, CEO cash compensation, excess CEO compensation, and excess cash compensation on the age of compensation committee members and the age dissimilarity between the CEO and compensation committee members. I show that older compensation committee members and a larger age dissimilarity between the CEO and compensation committee members curb the level of CEO compensation, thus reducing CEO total compensation and cash compensation. My findings are robust to a variety of robustness tests including firm-fixed effect, PSM approach, and sensitivity tests by controlling for CEO power.

My findings make a number of important contributions. First, after controlling for the economic and corporate governance variables of the firm, I find statistically reliable evidence that older compensation committees and a larger age dissimilarity between the CEO and compensation committee members are associated with a lower level of total CEO pay, total CEO cash pay, excess CEO pay, and excess CEO cash pay. These findings are consistent with the literature highlighting that individuals' ethical standards increase with age, and age dissimilarity leads to cognitive independence and fosters cognitive conflicts between group members. Second, my study suggests inference to policymakers, who generally focus on the independence of audit committees: they could consider the needs for older compensation committee members and a larger age dissimilarity between the CEO and compensation committee members.

Appendix A.2 Definition of Variables

Variable	Definition
ROA	The ratio of net income to average total assets at the beginning of the year.
Tobin's q	(Market Cap+Total Liabilities+Preferred Equity+Minority Interest) /Total assets.
Stock Return	The average monthly stock return in fiscal year.
Stock Volatility	A measure of a stock's average annual price movement to a high and low from the mean price for each year.
TA	The logarithm of total assets.
Leverage	The ratio of total liabilities to total assets.
MB Ratio	The market value of the ordinary equity divided by the balance sheet value of the ordinary equity in the company.
CEO First Year	The dummy variable coded 1 if it is the CEO's first year of service at that firm, 0 otherwise.
CEO Tenure	The number of years the CEO has been serving in the role as CEO.
CEO Age	The age of the CEO in years.
Board Size	The total number of directors on the board.
Outsider Ratio	The ratio of the number of non-executive directors to the total number of directors.
CC Size	The total number of compensation committee members.
Busy CC Member	The average number of current quoted board seats that compensation committee members hold.
Average CC Tenure	The average number of years that compensation committee members have been serving on the compensation committee.
Independent Ratio In CC	The percentage of compensation committee members who are independent.
Age_Comp	The average age of compensation committee members.
Age_Dissimilarity	The absolute age dissimilarity between the CEO and compensation committee members.
Average Outsider Age	The average age of non-executive directors.
Average Outsider Tenure	The average number of years that compensation committee members have been serving on the board.

TC	The log of the sum of all compensation: salary, bonus, equity-linked, pension, and other.
Cash_C	The log of the sum of base salary and bonus

Chapter 4 CEO general managerial skills and investment efficiency

4.1 Introduction

This study examines the effect of CEOs' human capital on corporate investment policies. In particular, I try to disentangle the impacts of CEOs with general human capital and those with firm-specific human capital on firms' investment decisions, measured by the general managerial ability index (Gen-Index) (Custódio et al., 2013). Extensive research in accounting and finance has been devoted to understanding the driving force of firms' investment decisions, yet few empirical studies have directly examined the influence of CEOs' human capital on firms' investment policies. In the current study, I explore the CEOs' decision-making processes for firms' investment in the context of incentives and risk-taking by examining whether the job histories of CEOs impact the divations from firms' optimal investment levels.

Under the Modigliani and Miller (1958) paradigm, the sole driver of a firm's investment policy is the investment opportunities, which is proxied by Tobin's Q. In the perfect world, firms invest all positive net present value (NPV) projects until the marginal value of the benefit of capital investment equals the marginal value of the cost of capital investment. (e.g., Hayashi, 1982; Abel, 1983). However, the previous studies also document that firms may in practice deviate from the optimal investment level due to various imperfections, which in turn can lead to either overinvestment or underinvestment (Chen et al., 2014). Previous studies have long recognized two primary frictions: information asymmetry between insiders (e.g., managers) and outsiders (e.g., investors) (Myers and Majluf, 1984) and agency problems (Jensen and Meckling, 1976). Under the information asymmetry view, managers withdrew from positive NPV projects due to costly external equity and debt financing, which in turn led to underinvestment. In contrast, under the agency problem view, managers had incentives to overinvest to reap personal perquisites and to build large empires, which in practice expropriated firms’ resources. Jenson (1986), for example, suggests that managers with free cash flow tend to overinvest due to empire building incentives, which is particularly true when the corporate governance of the firm is poor.

CEOs with general managerial skills (hereafter referred to as generalist CEOs), defined broadly as the new CEOs who accumulate general managerial capital through their lifetime working experience in public traded firms that is transferable across firms and industries, are most desired candidates when modern corporations hire new CEOs. Generalist CEOs are particularly more valuable when firms experience shock and restructuring (Eisfeldt and Papanikolaou, 2013), since the general human capital they have accumulated through broad work experience can be useful during such transformative changes. In contrast, the CEOs with specific managerial skills are defined as the new CEOs who have skills specific to a firm or industry (hereafter referred to as specialist CEOs) (Custódio et al., 2013). I use the Gen-Index developed by Custódio et al. (2013) as a proxy for CEOs’ general managerial skills. Generalist CEOs are expected to be rich in human capital, have higher risk-taking incentives (May, 1995), increase agency issues in their firms, and enlarge the misalignment of incentives with shareholders. While generalist CEOs are the main focus of interest of my study, specialist CEOs can serve as a useful benchmark for comparing firms’ investment policies.

The previous literature shows that generalist CEOs receive an annual pay premium compared with specialist CEOs, and the pay premium is even higher when generalist CEOs are hired to cope with complex tasks (Custódio et al., 2013). Mishra (2014) argues that generalist CEOs process richer general managerial skills and have different risk-taking incentives compared with specialist CEOs. Correspondingly, he finds that investors require higher returns from firms with generalist CEOs in response to their potential increased risk-taking. Based on these findings, it can be argued that CEOs with broad work experience and general managerial skills have higher CEO human capital, higher risk-taking incentives (compared with specialist CEOs), and increase the agency issues inside firms. Investment policies leave a significant discretion for top managers, as there are inherent uncertainties and complexities involved in making such decisions. When there is divergence in incentives between the CEOs and shareholders, agency issues and moral hazard can result in investment inefficiency (either overinvestment or underinvestment). CEOs may invest inefficiently by carrying out inappropriate projects, or growing firms beyond their optimal size in order to consume private perquisites and expropriate firms' existing resources at the expense of shareholders' interests. Generalist CEOs who accumulate higher human capital through a broad functional background experience are expected to move across firms and industries more easily, and they are frequently popular candidates for executive search firms. In other words, a decrease in the risk of remaining unemployed due to popularity among executive search firms could increase risk-taking by generalist CEOs. Generalist CEOs who face a broader set of outside options which in turn can act as the labour market mechanisms of tolerance of failure, are thus encouraged to take excessive risk. In addition, compared with specialist CEOs, the long-term earnings of a generalist CEO are less contingent on the performance, future, and longevity of the firm she currently serves as CEO, suggesting that generalist CEOs may have incentives to take excessive risk, focus on the short-term performance of projects, and choose investment opportunities that diverge from the interest of shareholders without fearing for any impact of such strategy on the future of the firm. Given the misalignment of incentives of generalist CEOs and that of shareholders, I posit that generalist CEOs are more likely to be involved in investment inefficiency compared with specialist CEOs.

To test this hypothesis, I employ a sample of 15,712 firm–year observations of S&P 1500 firms from 1993 to 2006. I follow the recent literature on generalist CEOs (Custódio et al., 2013) to use the Gen-Index to measure the general managerial skills of the new CEO. The investment inefficiency is the deviation from the firms' expected investment level (Richardson, 2006). I find strong evidence that generalist CEOs increase the firms' investment inefficiency. This result is in harmony with the agency view of investment inefficiency and confirms that the functional background and lifetime experience of the CEO can play a fundamental role in firms' investment policies. Further sub-sample analysis shows that the positive relationship between the presence of generalist CEOs and investment inefficiency is generally driven by firms with poor corporate governance quality, higher level of information asymmetry, and lower level of financial constraint. This finding is also robust to using an alternative measure of general managerial skills, an alternative measure of investment inefficiency, and an approach to addressing endogeneity and self-selection bias.

I find that the positive relationship between the generalist CEOs and investment inefficiency is stronger for firms featuring higher levels of agency problems, for example, poor corporate governance quality, higher levels of information asymmetry, and more free cash flow from operations. Using residuals from an expected investment level model to capture underinvestment or overinvestment, I demonstrate that the generalist CEO is associated with higher overinvestment, which lends further support to the agency view of investment inefficiency. In contrast, in an underinvestment situation, I fail to find that generalist CEOs have a significant effect on investment inefficiency.

My study adds to the growing literature on the role of generalist CEOs in corporate policies by providing evidence on how generalist CEOs can affect investment policy. To the best of my knowledge, this is the first attempt to directly examine the impact of CEOs' general managerial ability on firms' investment efficiency. My study is also related to, but distinct from, some of the previous literature. First, Custódio et al. (2013) document that the CEO with general managerial ability tends to receive a fatter compensation package compared with the specialist CEO, as she is perceived to have ability and experience to manage organizations that are easily transferable across different firms and industries. However, the relationship between the CEOs with general managerial skills and firm performance is ambiguous, and the previous literature fails to build a positive relationship between the CEOs with general managerial skills and firm performance. Second, Mishra (2014) finds that investors require higher returns from firms with CEOs who are richer in general managerial skills, as the generalist CEOs have less incentive to reduce risk due to their future cash flow, are less dependent on their current firm, and in turn expropriate the agency problems inside it. Lastly, Custódio et al. (2017) find that CEOs with general managerial skills are more likely to foster innovation, as they can apply their skills elsewhere if risky innovation projects fail. While one could infer from the previous research that generalist CEOs have a distinct leadership style compared with specialist CEOs, none of these studies examines how the generalist CEO can affect investment efficiency through her role in worsening agency problems.

My findings also add new evidence on the determinants of investment efficiencies Dummy (i.e., Yoshikawa, 1980; Hayashi, 1982; Abel, 1983). Demonstrating an association between generalist CEOs and investment efficiency has several implications. First, it has a macro-economic implication, given the key role of investment as a determinant of growth. Second, it may not a beneficial for a firm lacking efficient monitoring mechanisms to hire a generalist CEO. My study complements the previous studies that examine the impact of generalist CEOs on the corporate decision-making process and extends earlier findings by considering in depth not only investment inefficiency but also its two sub-components: overinvestment and underinvestment.

The reminder of this paper proceeds as follows. In section 4.2, I develop the testable hypotheses. In section 4.3, I describe my data set and research design. In section 4.4, I present my main regression results. In section 4.5, I develop sub-sample analyses. In section 4.6, I present sensitivity analyses. Finally, section 4.7 concludes.

4.2 Background and investment efficiency

4.2.1 Determinants of investment efficiency

Investment efficiency represents one of most fundamental concerns for the firm. Under the paradigm of Modigliani and Miller (1958), the only driver of a firm's capital investment decision is the marginal Q ratio (e.g., Yoshikawa, 1980; Hayashi, 1982; Abel, 1983). In a perfect world without friction, the theory predicts that firms are likely to obtain financing for all positive NPV projects at the prevailing cost of capital and to continue to invest until the marginal benefit of capital investment equals the marginal cost of investment. However, the previous literature has identified various frictions that can distort a firm's optimal investment level. The existing literature documents two types of such friction: information asymmetries and agency problems (Stein, 2003)

The information asymmetry view (Myers and Majluf, 1984) contends that managers have private information concerning the firms' prospects, and so they would like to sell overpriced securities. However, investors are aware of the existence of information asymmetry and consequently discount the capital. Managers who are better informed about the prospects of the firms are likely to refuse to raise funds at the discount price, which in turn results in ex post under investment.

This information asymmetry view implies that managers act in the best interest of shareholders (Chen et al., 2014). However, the agency view posits that managers are self-interested. Thus, managers try to maximize their private benefits and tend to choose investment opportunities that are not in the best interests of shareholders (Jensen and Meckling, 1976). It argued that managers whose incentives are in conflict with shareholders are more likely to run large instead of profitable projects in order to consume perks and personal welfare owing to size effects, such as empire building (Blanchard et al., 1994). On the other hand, shareholders who are aware of the potential resource expropriation problem due to the divergence of incentives with the managers are more likely to discount the capital ex ante. These arguments receive empirical support from previous studies. For example, as mentioned in Jensen (1986), managers with free cash flow are inclined to overinvest induced by empire building, and such a prediction is especially true when firms lack strong corporate governance. Effective monitoring mechanisms can mitigate investment inefficiency problems by making it more difficult and costly for managers to overinvest in value destroying projects, reconfirming that the agency problem is a fundamental source of investment inefficiency.

4.2.2 Generalist CEOs and investment efficiency

The earlier literature suggests that CEOs with general managerial skills receive a fatter compensation package compared with generalist CEOs in response to prevailing demand for managers with general skills that can transfer across different firms and industries (Custódio et al., 2013). Mishra (2014) finds that CEOs with general managerial skills are positively related to the higher returns expected by investors, as generalist CEOs with in higher risk-taking incentives worsen any agency problems inside the firm. Custódio et al (2017) show that CEOs with general managerial skills spur innovation, since they are less sensitive to the failure of innovation projects, assuming that they can benefit from the efficient labour market for executives. Motivated by these studies, I argue that CEOs with general managerial skills have higher incentives than their counterpart specialist CEOs to take risks in their investment decisions by investing in value destroying projects that can maximize their own personal welfare. As the wealth of generalist CEOs is less contingent on future performance compared with specialist CEOs, I argue that there is a high likelihood that the incentives of generalist CEOs are not aligned with the shareholders and in turn exacerbate any agency issues inside the firm.

In sum, I develop a hypothesis concerning the potential relationship between generalist CEOs and investment efficiency. My underlying logic mainly resembles the predictions from an agency viewpoint. I predict that CEOs with general managerial skills are positively associated with investment inefficiency. This argument arises from the inability to align the incentives of generalist CEOs with shareholders. I also conjecture that the effects of the misalignment of incentives will be especially strong for firms featuring a high level of agency problems and high corporate governance needs, because managers in these firms are more likely to overinvest due to lack of effective monitoring.

The above discussion leads to the following discussion:

H1: CEOs with general managerial skills are positively associated with investment inefficiency.

4.3 Sample, data, and descriptive statistics

4.3.1 Data and sample selection

To empirically study the relationship between generalist CEOs and investment inefficiency, my sample begins with the 1993–2006 sample of S&P 1500 firms used in Custódio et al. (2013). I retain only the firm–year observations with sufficient financial data obtained from Compustat to construct a dependent variable (investment inefficiency) and control variables and exclude firms in the financial industry (SIC codes 6000–6999) which are subject to regulations and have different investment behaviour. My final sample consists of 15,712 firm–year observations over 1993–2006.

My main variable of interest is generalist skills. I use the Gen-Index (generalist skills) from Custodio et al. (2013). The Gen-Index captures the generality of CEO's human capital based on their lifetime working experience in public traded firms prior to their current CEO role. Generally speaking, the CEO with more diversified working experience – for example, having worked in different organizational areas or industries, or held the CEO position at another firm prior to her current position, or worked in multi-division conglomerate firm, is classified as having more general skills. Custodio et al. (2013) define Gen-Index using the following equation:

$Gen-Index_{i,t}$= $0.268X1_{i,t}$+ $0.312X2_{i,t}$+ $0.309X3_{i,t}$ + $0.218X4_{i,t}$+ $0.153X5_{i,t}$ (4.1)

Where X1 represents the number of positions that the CEO has held during her career; X2 represents the number of firms where a CEO has worked; X3 represents the number of industries based on 4-digit SIC code in which the CEO has worked; X4 is an indicator variable set to one if a CEO previously held a CEO position in another firm and zero otherwise; and X5 is an indicator variable set to one if a CEO previously worked in a multi-division conglomerate and zero otherwise.

4.3.2 Measurement of investment inefficiency

Based on earlier studies (e.g., Richardson, 2006; Stoughton et al., 2017), I first estimate the following regression and use the residues as a firm-specific proxy for deviation from predicted investment:

$$INEW_{i,t} = \beta_0 + \beta_1 V/P_{i,t-1} + \beta_2 Leverage_{i,t-1} + \beta_3 Cash_{i,t-1} + \beta_4 Age_{i,t-1}$$

$$+\beta_5 Size_{i,t-1} + \beta_6 Return_{i,t-1} + \beta_7 INEW_{i,t-1} + \varepsilon_{i,t} \qquad (2)$$

$INEW_{i,t}$[3] is the measure of new investment, computed as the sum of capital expenditure research and development (R&D) expenditure, acquisition, and minus sale of property, plant and equipment and amortization and depreciation scaled by total assets. V/P captures the growth opportunities of the firm, where V represents the value of assets in place and P represents the value of equity of the firm. Firms

[3] See Appendix A for detailed variable definition.

with higher V/P are classified as having lower growth opportunities. Thus, I predict a negative relationship between V/P and investment. Leveraged firms and firms with lower cash holdings are more likely to experience financial constraints. Therefore, I include Leverage and Cash as control variables. Leverage is defined as the total debts divided by total assets. Cash is calculated as the cash and short term investment (CHE) scaled by total assets (AT) of the firm. I include the natural log of firm total assets (AT) to control for the size effect. Age is calculated as the natural log of one plus the number of years the firm has been listed on the Center for Research in Security Prices (CRSP). Return is defined as the change in the market value of the firm (CSHO*PRCC_F). I also include industry and year fixed effects in my regression model.

The absolute value of the residual from Eq. (2) forms my measurement of investment inefficiency ($INF_{i,t}$).

Both underinvestment and overinvestment are regarded as detrimental to the interests of shareholders. I classify $INF_{i,t}$ as underinvestment ($UND_{i,t}$) if the residue from Eq. (2) is negative and as overinvestment ($OVR_{i,t}$) if the residue from Eq. (2) is positive. The separation of investment inefficiency into underinvestment and overinvestment allows us to distinguish the roles that generalist CEOs play in two sources of investment inefficiency.

Table 4.1 Summary statistics

This table reports summary statistics for all the variables used in my empirical analysis. The sample covers 15,172 firm–year observations with non-missing values for all explained and explanatory variables. Financial firms (SIC codes 6000–6999) are excluded. The number of the observations, mean, standard deviation, 25th percentile, and 75th percentile are reported from left to right, in sequence. Detailed definitions of all the explained and explanatory variables are described in Appendix A.3.

VARIABLES	(1) N	(2) mean	(3) s.d.	(4) min	(5) max	(6) p25	(7) p50	(8) p75
INew	15,274	0.072	0.092	-0.085	0.435	0.010	0.048	0.110
Leverage	15,274	0.321	0.260	0	1.248	0.085	0.310	0.476
Cash	15,274	0.169	0.223	0.001	1.146	0.022	0.074	0.229
Size	15,274	7.064	1.530	3.956	11.04	5.936	6.924	8.057
Return	15,274	0.227	0.624	-0.747	3.263	-0.136	0.111	0.413
MTB	15,274	1.874	1.520	0.387	9.348	0.963	1.390	2.176
Tangibility	15,274	0.297	0.217	0.012	0.890	0.129	0.240	0.418
Age	15,274	2.915	0.800	1.099	4.382	2.303	2.944	3.526
Sales Growth	15,266	0.162	0.703	-0.998	60.02	0.014	0.094	0.210
Gen-Index	15,274	-0.012	0.950	-1.420	2.908	-0.712	-0.182	0.544
Analyst Coverage	15,274	1.631	1.153	0	3.526	0	1.946	2.565
G-Index	5,408	9.266	2.658	2	17	7	9	11
V/P	15,274	0.503	0.339	-0.284	1.925	0.288	0.443	0.646
Gen-Dummy	16,487	0.497	0.500	0	1	0	0	1
Sales Growth	15,176	0.161	0.314	-0.451	1.861	0.016	0.099	0.222
Investment	15,176	0.158	0.150	0.006	0.875	0.063	0.114	0.199

4.3.3 Descriptive statistics

Table 4.1 reports the summary information for the dependent variable and explanatory variables used in my study. The mean and median value of the Gen-Index is –0.012 and –0.182, respectively. The mean and standard deviation of INEW are 0.072 and 0.092, which are similar to those reported in Richardson (2006). The average firm has a leverage ratio to total assets of 32.1% and a cash ratio of 0.16. The descriptive statistics of my investment related control variables are comparable to earlier studies (e.g., Richardson, 2006; Stoughton et al., 2017).

Table 4.2 Optimal investment level regressions

Table 2 reports the OLS regression results of the optimal investment expenditure model developed by Richardson (2006). The dependent variable is the measures of new investment ($INEW_{i,t}$) at year t. The explanatory variables include V/P, Leverage, Cash, Age, Size, Return, and $INEW_{i,t-1}$. All explanatory variables are defined in Appendix A.3 and are measured as of time t–1. I include 2-digit industry and year fixed effects but they are not reported. The t-values are reported in parentheses. The standard errors are clustered by firm level. Financial firms (SIC codes 6000–6999) are excluded from the analysis. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	(1) INEW
V/P	-0.030***
	(-12.981)
Leverage	-0.037***
	(-9.191)
Cash	0.069***
	(11.153)
Age	-0.002*
	(-1.813)
Size	-0.001
	(-1.167)
Return	0.004***
	(2.928)
INew	0.321***
	(22.862)
Constant	0.064***
	(7.589)
Observations	16,376
Adjusted R-squared	0.314
Industry dummy	Yes
Year dummy	Yes

Table 4.3 Generalist CEOs and investment inefficiency

Table 3 reports the multivariate estimation where the dependent variables are three measures of investment inefficiency: INF, OVE, and UND, estimated by the optimal investment expenditures model. The explanatory variables include a proxy for generalist CEOs (either Gen-Index or Gen-dummy), MTB, Leverage, Cash, Tangibility, Age, and Size, all of which are lagged one year. The different measures of investment inefficiency compare six different sub-optimal investment levels: (model 1) the total investment inefficiency, (model 2) the overinvestment, (model 3) the underinvestment, (model 4) the total investment inefficiency, (model 5) the overinvestment, (model 6) the underinvestment. I employ two proxies for generalist CEOs. Model 1–3 present the results from using the Gen-dummy as a proxy for generalist CEOs. Model 4–6 present the results from using the Gen-index as a proxy for generalist CEOs. All explanatory variables are defined in Appendix A.3 and are measured as of time t–1. I include 2-digit industry and year fixed effects but they are not reported. The t-values are reported in parentheses. The standard errors are clustered by firm level. Financial firms (SIC codes 6000–6999) are excluded from the analysis. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	INF	OVE	UND	INF	OVE	UND
MTB	0.001	0.001	0.000	0.001	0.001	0.000
	(1.487)	(1.439)	(0.368)	(1.489)	(1.460)	(0.366)
Leverage	0.006**	0.002	0.006***	0.006**	0.002	0.006***
	(2.127)	(0.425)	(2.643)	(2.135)	(0.426)	(2.623)
Cash	0.028***	0.026***	0.027***	0.028***	0.026***	0.027***
	(7.369)	(3.680)	(8.039)	(7.390)	(3.708)	(8.037)
Tangibility	-0.000	-0.011	0.001	-0.000	-0.011	0.001
	(-0.022)	(-1.542)	(0.258)	(-0.043)	(-1.546)	(0.254)
Age	-0.001	-0.000	-0.001**	-0.001	-0.000	-0.001**
	(-1.436)	(-0.094)	(-2.340)	(-1.401)	(-0.073)	(-2.324)
Size	-0.007***	-0.008***	-0.005***	-0.007***	-0.008***	-0.005***
	(-13.696)	(-9.300)	(-13.846)	(-13.699)	(-9.363)	(-13.923)
Gen-Index	0.001**	0.003**	0.000			
	(2.314)	(2.336)	(0.773)			
Gen-Dummy				0.003**	0.005**	0.001
				(2.048)	(2.279)	(0.859)
Constant	0.091***	0.118***	0.076***	0.089***	0.115***	0.076***
	(14.477)	(9.623)	(13.065)	(14.344)	(9.386)	(13.105)
Observations	15,172	6,086	9,086	15,172	6,086	9,086
Adjusted R-squared	0.095	0.086	0.168	0.095	0.086	0.168
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes

4.4 Empirical tests of the relationship between generalist CEOs and investment inefficiency

In this section, I conduct analyses to test my main hypothesis. I first present a negative relationship between generalist CEOs and investment inefficiency. I further investigate separately the relationship between generalist CEOs and underinvestment and overinvestment. Then, I employ the propensity score matching (PSM) procedure to test the robustness of my main findings.

4.4.1 Generalist CEOs and investment inefficiency

To test my main hypothesis, I estimate the following regression model to capture the impact of generalist CEOs on investment inefficiency:

$$INF_{i,t} = \beta_0 + \beta_1 Gen - Index_{\,i,t-1}(Gen - Dummy_{\,i,t-1}) + \beta' X_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

The dependent variable $INF_{i,t}$ represents one of three proxies: INF (investment inefficiency), UND (underinvestment), and OVR (overinvestment). Gen-Index represents the generalist skill of the CEO. The CEO with the higher level of Gen-Index is classified as having more general skills. I also use an indicator variable Gen-Dummy referring to the generalist CEO, taking the value of one if a CEO's Gen-Index value is above the year's median Gen-Index. The key coefficient of interest of Eq. (3) is β_1, which represents the effect of generalist CEOs on investment inefficiency. The control variables in Eq. (3) refer to a set of firm level control variables that may influence investment inefficiency: market to book ratio (MTB), Leverage, Cash, Size, Tangibility, and Age. I also control for industry (based on the two-digit SIC code) and year fixed effects.

Table 4.3 reports the results of estimating Eq. (3) using OLS, with standard errors clustered at the firm level. My findings confirm my hypothesis regarding the link between firms featuring CEOs with general managerial skills and investment efficiency. In column (1), I regress my dependent variable investment inefficiency (INF) on my proxy for generalist CEO (Gen-Index) and a set of control variables. I include 2-digit industry and year dummies in order to control for potential time trends and time-invariant industry heterogeneity. Consistent with my hypothesis, the estimated coefficient on Gen-Index is positive and statistically significant (at the 5% level), suggesting that the generalist CEO leads to lower investment efficiency. This positive association is also economically significant: a one standard deviation increase in Gen-index (0.950) decreases the INF of an average firm by 8.33%. In terms of control variables, I observe that firms with more leverage and which are less financially constrained (with more cash) invest less efficiently. I also find that larger firms invest more efficiently.

In order to distinguish the effects of a generalist CEO on two sources of investment efficiency – underinvestment (UND) and overinvestment (OVR) – I regress underinvestment (UND) and overinvestment (OVR) on the generalist CEO (Gen-index) and a set of control variables in column (2) and (3), respectively. I find that the positive relationship between the generalist CEO and investment inefficiency is only statistically significant for the overinvestment sample. This finding actually further enhances my argument that the generalist CEO has a higher risk-taking incentive, which explains why the firm with the generalist CEO has a higher tendency to overinvestment.

Models 4 to 6 of Table 4.3 examine the effect of alternative measurment of the generalist CEO on investment inefficiency. I use a dummy variable (Gen-Dummy) to proxy for the generalist CEO, calculated as one if the CEO has an above median ranking in Gen-Index and zero otherwise. The effect is similar for the alternative measure of generalist CEOs. In model 3, Gen-Dummy loads positively and is statistically significant, suggesting that the generalist CEO is positively associated with investment inefficiency. Models 5–6 present the results of separately regressing investment inefficiency on overinvestment (OVR) and underinvestment (UND). As expected, the positive relationship between the generalist CEO and investment is driven by the overinvestment sample. This is consistent with results presented in Models 1–3 as well as my expectations: generalist CEOs increase firms' investment inefficiency and, more precisely, generalist CEOs increase the overinvestment level.

Table 4.4 Propensity score matching analysis

Table 4 reports the PSM estimation results. Panel A presents the regression results from a logit model of the likelihood of the presence of the CEOs with general managerial skills. The dependent variable is an indicator variable (Gen-dummy) that equals one if the firm–years have a Gen-Index greater than annual median Gen-Index and zero otherwise. Panel A reports the pre-match logit model on the choice of having generalist CEOs and the post-match diagnostic regression. Panel B reports the univariate comparison between the treatment group (firms with generalist CEOs) and the control group (firms with specialist CEOs). Panel C reports estimates of the average treatment effects. The dependent variable includes alternative measures of investment inefficiency, namely, INE (total investment inefficiency), Over (overinvestment) and Under (underinvestment). All explanatory variables are defined in Appendix A.3 and are measured as of time t–1. I include 2-digit industry and year fixed effects but they are not reported. The t-values are reported in the parentheses. The standard errors are clustered by firm level. Financial firms (SIC codes 6000–6999) are excluded from the analysis. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
VARIABLES	Pre-match	Post-match
Size	0.433***	-0.003
	(11.178)	(-0.074)
Leverage	0.451***	0.064
	(2.752)	(0.381)
RD	-0.000*	-0.000
	(-1.855)	(-0.006)
MTB	-0.029	-0.007
	(-1.100)	(-0.265)
Cash	0.326	0.011
	(1.562)	(0.054)
Tangibility	-0.886***	-0.101
	(-2.929)	(-0.322)
Age	-0.086	0.019
	(-1.466)	(0.304)
Constant	-2.487***	0.088
	(-5.034)	(0.175)
Pseudo R-squared	0.0836	0.0012
Observations	15,176	11,055
Industry dummy	Yes	Yes
Year dummy	Yes	Yes

Panel B: Differences in firm characteristics (0.005)

	Firm–year obs. With Specialist. (N = 5,480)	Firm–year obs. With Generalist. (N = 5,575)	Difference	T-stat
MTB	1.866	1.854	0.011	0.404
Leverage	0.316	0.318	-0.002	-0.460
Cash	0.174	0.174	-0.000	-0.007
Tangibility	0.287	0.284	0.003	0.844
Age	2.888	2.897	-0.009	-0.593
Size	6.969	6.974	-0.005	-0.194

Panel C: PSM estimator

	Firm–year obs. With Specialist. (N = 5,480)	Firm–year obs. With Generalist. (N = 5,575)	Difference	T-stat
INF	0.050	0.053	-0.003**	-2.429
OVE	0.064	0.067	-0.004*	-1.745
UND	0.042	0.043	-0.001	-1.263

4.4.2 Propensity score matching analysis

In order to mitigate concerns that there are unobservable factors not included in my empirical analysis that affect both the firm's choice of generalist CEO and the level of investment inefficiency, I employ the PSM procedure in this section (Rosenbaum and Rubin, 1983). The PSM procedure allows us to compare specific economic outcomes between firms with generalist and firms with specialist CEOs. First of all, I estimate the firm's probability of hiring a generalist CEO, using a logit model that regresses an indicator variable which equals one if the CEO has an above median ranking in Gen-Index and zero otherwise on control variables from the baseline model. In the second step, I use a propensity score estimated from logistic estimations to match firms with generalist CEOs (i.e., treatment group) and specialist CEOs (i.e., control group) with the closest propensity score. To do so, I adopt nearest neighbour matching without replacement techniques, requiring that the maximum difference between the propensity score of each firm with a generalist CEO and that of each firm with a specialist CEO does not exceed 0.5%[4] in absolute value.

To ensure that firms with generalist CEOs (i.e., treatment group) and firms with specialist CEOs (i.e., control group) are indistinguishable in terms of observable firm characteristics, I perform two diagnostic tests. Panel A of Table 4.4 presents the logit model regression results for pre-match sample and post-match sample in column (1) and column (2), respectively. Comparing the results of column (1) and column (2), I find that none of the estimated coefficients is statistically significant in the post-match sample and the pseudo R-squared drops significantly from 0.084 for the pre-match sample to 0.001 for the post-match sample, which indicates that all observable firm characteristics except for the presence of the generalist CEO are successfully removed after the PSM procedure.

Panel B of Table 4.4 presents the results of my second diagnostic test, consisting of the results when I check the significance of differences for each observable firm characteristic between the generalist and the specialist CEO sample. The results again indicate that there is no significant difference in observable firm characteristics between the generalist and the specialist CEO sample. Taken together, both of my two diagnostic tests suggest that all observable firm characteristics except for the presence of the generalist CEO are removed after the PSM procedure.

---

[4] My findings remain robust when I use maximum permissible difference in propensity score of 0.1% in absolute value.

Panel C of Table 4.4 presents the PSM estimates. The results largely reinforce the multivariate analysis, suggesting that there are significant differences in investment inefficiency and overinvestment between firms with generalist CEOs and firms with specialist CEOs. As expected, the firms with generalist CEOs have higher investment inefficiency (overinvestment) than the firms with specialist CEOs.

Table 4.5 The effect of corporate governance quality on the relationship between generalist CEOs and investment inefficiency

Table 5 reports the regression estimates of whether corporate governance quality can affect the relationship between firms featuring CEOs with general managerial skills and investment inefficiency. I adopt an anti-takeover protection index (G-Index) constructed by Gompers et al. (2003) to proxy for corporate governance quality. High (Low) values of the G-Index indicate high (low) anti-takeover protection and low (high) corporate governance quality. Strong (Weak) corporate governance denotes that the firm has a total governance score below (above) the median of the G-Index. The dependent variables are the firm investment inefficiency proxy variables: INF (model 1–model 2), OVE (model 3–model 4), and UND (model 5–model 6). The independent variables of interest are the proxy for generalist CEOs (Gen-Index). All explanatory variables are defined in Appendix A.3 and are measured as of time t–1. I include 2-digit industry and year fixed effects but they are not reported. The t-values are reported in parentheses. The standard errors are clustered by firm level. Financial firms (SIC codes 6000–6999) are excluded from the analysis. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	INF-Strong	INF-Weak	OVE-Strong	OVE-Weak	UND-Strong	UND-Weak
MTB	0.001	0.001	0.002	0.000	-0.000	-0.001
	(0.735)	(0.609)	(1.161)	(0.194)	(-0.354)	(-0.876)
Leverage	0.015***	0.003	0.011	-0.013	0.013**	0.010**
	(2.883)	(0.524)	(1.048)	(-1.267)	(2.544)	(2.011)
Cash	0.032***	0.033***	0.027*	0.040	0.029***	0.034***
	(4.966)	(2.621)	(1.943)	(1.307)	(5.191)	(4.756)
Tangibility	0.010	-0.012	0.006	-0.026	0.006	-0.006
	(1.288)	(-1.468)	(0.410)	(-1.501)	(0.667)	(-0.993)
Age	-0.002	-0.004**	-0.003	-0.010***	0.000	-0.001
	(-0.928)	(-2.029)	(-0.941)	(-2.926)	(0.239)	(-0.431)
Size	-0.007***	-0.006***	-0.008***	-0.008***	-0.006***	-0.005***
	(-7.492)	(-6.383)	(-4.494)	(-3.946)	(-7.784)	(-5.875)
Gen-Index	0.000	0.004***	0.002	0.008***	-0.000	0.001
	(0.231)	(2.727)	(0.611)	(3.101)	(-0.060)	(1.035)
Observations	3,030	2,341	1,194	928	1,836	1,413
Adjusted R-squared	0.096	0.062	0.085	0.088	0.168	0.098
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes

Table 4.6 The effect of external monitoring quality on the relationship between generalist CEOs and investment inefficiency

Table 6 reports the regression estimates of whether external monitoring quality can affect the relationship between firms featuring CEOs with general managerial skills and investment inefficiency. I adopt analyst coverage to proxy for external monitoring quality. High (Low) values of analyst coverage indicate low (high) information asymmetries between insiders and outsiders and high (low) external monitoring quality. Strong (Weak) external monitoring quality denotes that the firm has a total analyst coverage above (below) the median of analyst coverage. The dependent variables are the firm investment inefficiency proxy variables: INF (model 1–model 2), OVE (model 3–model 4), and UND (model 5–model 6). The independent variables of interest are the proxy for generalist CEOs (Gen-Index). All explanatory variables are defined in Appendix A.3 and are measured as of time t–1. I include 2-digit industry and year fixed effects but they are not reported. The t-values are reported in parentheses. The standard errors are clustered by firm level. Financial firms (SIC codes 6000–6999) are excluded from the analysis. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	INF-Low	INF-High	OVE-Low	OVE-High	UND-Low	UND-High
MTB	0.002***	-0.001	0.004***	-0.001	0.001	-0.000
	(2.650)	(-0.913)	(3.048)	(-1.064)	(1.244)	(-0.762)
Leverage	0.008**	0.002	0.003	-0.002	0.007**	0.006*
	(2.306)	(0.666)	(0.503)	(-0.240)	(2.131)	(1.744)
Cash	0.027***	0.029***	0.015	0.038***	0.028***	0.025***
	(5.039)	(5.872)	(1.482)	(3.913)	(6.042)	(5.699)
Tangibility	-0.001	-0.001	-0.013	-0.011	0.002	-0.000
	(-0.163)	(-0.168)	(-1.315)	(-0.900)	(0.305)	(-0.043)
Age	-0.000	-0.002*	0.000	-0.001	-0.001	-0.002**
	(-0.445)	(-1.698)	(0.215)	(-0.689)	(-1.485)	(-2.030)
Size	-0.007***	-0.007***	-0.008***	-0.008***	-0.005***	-0.005***
	(-9.351)	(-9.801)	(-5.827)	(-6.295)	(-8.836)	(-10.020)
Gen-Index	0.002*	0.001	0.004**	0.001	0.000	0.001
	(1.940)	(1.167)	(2.126)	(0.964)	(0.098)	(1.176)
Constant	0.077***	0.104***	0.100***	0.134***	0.069***	0.083***
	(9.949)	(12.876)	(6.218)	(7.943)	(8.849)	(11.142)
Observations	7,981	7,191	3,073	3,013	4,908	4,178
Adjusted R-squared	0.087	0.104	0.083	0.088	0.157	0.178
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes

Table 4.7 The effect of financial constraints on the relationship between generalist CEOs and investment inefficiency

Table 7 reports the regression estimates of whether financial constraints can affect the relationship between firms featuring CEOs with general managerial skills and investment inefficiency. To study the impact of financial constraints on the association between generalist CEOs and investment inefficiency, I separate firms according to the likelihood that firms will suffer from financial constraints. I classify firms with positive dividend paying as financially unconstrained firms, and firms with non-dividend paying as financially constrained firms, since financially constrained firms tend to pay lower or no dividends to reduce the necessity of raising external funds in the future (Fazzari et al., 1988). The dependent variables are the firm investment inefficiency proxy variables: INF (model 1–model 2), OVE (model 3–model 4), and UND (model 5–model 6). The independent variables of interest are the proxy for generalist CEOs (Gen-Index). All explanatory variables are defined in Appendix A.3 and are measured as of time t–1. I include 2-digit industry and year fixed effects but they are not reported. The t-values are reported in parentheses. The standard errors are clustered by firm level. Financial firms (SIC codes 6000–6999) are excluded from the analysis. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	INF-NON	INF-FC	OVE-NON	OVE-FC	UND-NON	UND-FC
MTB	0.001	0.000	0.002	0.001	-0.000	0.000
	(1.117)	(0.780)	(1.200)	(0.599)	(-0.770)	(0.501)
Leverage	0.007	0.006*	-0.001	0.006	0.012***	0.003
	(1.596)	(1.798)	(-0.154)	(0.954)	(3.542)	(1.115)
Cash	0.035***	0.027***	0.049***	0.025***	0.037***	0.024***
	(4.618)	(5.978)	(2.606)	(2.965)	(6.252)	(6.068)
Tangibility	0.000	-0.000	-0.010	-0.013	0.001	0.001
	(0.050)	(-0.002)	(-0.949)	(-1.216)	(0.241)	(0.165)
Age	-0.001	-0.002**	-0.000	-0.002	-0.002*	-0.003***
	(-1.171)	(-1.975)	(-0.124)	(-1.014)	(-1.818)	(-2.815)
Size	-0.007***	-0.007***	-0.010***	-0.008***	-0.006***	-0.006***
	(-11.109)	(-8.389)	(-8.139)	(-5.301)	(-11.574)	(-8.749)
Gen-Index	0.001*	0.001	0.003*	0.003	0.001	0.000
	(1.807)	(1.542)	(1.820)	(1.602)	(0.960)	(0.254)
Constant	0.088***	0.099***	0.120***	0.139***	0.073***	0.086***
	(10.295)	(8.636)	(7.409)	(5.136)	(10.253)	(9.323)
Observations	7,825	7,347	3,001	3,085	4,824	4,262
Adjusted R-squared	0.090	0.087	0.092	0.077	0.177	0.144
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes

4.5 Sub-sample analysis

My study has so far ignored how generalist CEOs interact with corporate governance monitoring mechanisms to influence investment efficiency. To examine whether the impact of the generalist CEO in investment inefficiency is more pronounced for firms with poor corporate governance quality, low analyst coverage, and more financially constrained firms, I enlarge the framework of my study by conducting a sub-sample analysis.

First, I use the governance index (G-Index) developed by Gompers et al. (2003) to proxy for corporate governance quality. The G-index consists of 24 corporate governance provisions regarding to firms' anti-takeover protection, obtained from the RiskMetrics Governance Legacy database. The G-Index represents the total number of anti-takeover provisions at the firm level. A higher G-Index indicates weaker shareholder rights and poorer corporate governance quality (Gompers et al., 2003). I posit that generalist CEOs, by undertaking more risk, will increase investment inefficiency more in poorly governed firms. I split my sample firms into two categories: a weak corporate governance group and a strong corporate governance group based on the median value of the G-Index. Specifically, I classify firms with a G-Index above the median as firms with weak corporate governance and firms with a G-Index below the median as firms with strong corporate governance. Table 4.5 reports the sub-sample regression results of re-estimating Eq. (3) using my three measures of investment inefficiency (INF, UND, and OVR) as dependent variables. I posit that the generalist CEO who has higher risk-taking incentives, which may be misaligned with those of shareholders, will increase investment inefficiency more in firms with poor corporate governance quality and high corporate governance need. Column (1) and column (2) report the results of regressing investment inefficiency (INF) on the Gen-Index for high G-Index firms and low-G-Index firms, respectively. As expected, I find that the estimated coefficients on the Gen-Index are positive for both sub-samples but only significant for firms with an above median number in the G-index, suggesting that the generalist CEO has the most pronounced and significant effects on investment inefficiency for firms with a high G-index, which indicates weak corporate governance. The estimated coefficients on the Gen-Index are much larger in absolute value for the sub-sample with an above median corporate governance index (G-index) than for the sub-sample with below-median corporate governance index (G-index). Taken together, the results are consistent with my hypothesis that the increased risk-taking of the generalist CEO exerts an impact on the investment inefficiency also subject to corporate governance quality. Column (3) through Column (6) of Table 4.5 report the regression results of regressing UND and OVR for my weak and strong corporate governance sub-sample, respectively. The results are consistent with my previous results as well as with my expectations: the generalist CEO increases overinvestment, and the results are driven by the firms with weak corporate governance quality.

Second, I use analyst coverage to proxy for the firm's asymmetric information. Financial analyst coverage reduces information asymmetry between insiders (i.e., managers) and outsiders (i.e., shareholders) (Lang et al., 2004). If the positive relationship between the generalist CEO and investment inefficiency is due to the CEO's higher risk-taking incentives, such as empire building, one can predict that the strength of the positive relationship between the generalist CEO and investment inefficiency will be attenuated for firms with more informed outside investors. Analyst coverage is measured as the natural logarithm of one plus the number of following analysts during the fiscal year. The higher level of analyst coverage suggests a lower level of information asymmetry. Table 4.6 reports the sub-sample regression results of re-estimating Eq. (3) using my three measures of investment inefficiency (INF, UND, and OVR) as dependent variables. I conjecture that the positive relationship between the generalist CEO and investment inefficiency is moderated when the outside shareholders are more informed. I split the sample into two sub-samples based on the median value of analyst coverage and separately estimate the sub-samples. Column (1) and column (2) report the sub-sample regression results when the dependent variable is INF. Consistent with my prediction, the estimated coefficients on the Gen-Index are significantly positive only for the below median analyst coverage group. The coefficients on the Gen-Index are also much larger in absolute value for the group with a higher level of information asymmetry than for the group with a lower level of information asymmetry. Column (3) through Column (6) of Table 4.6 report the regression results of regressing OVE and UND for my higher level of information asymmetry sub-sample and lower level of information asymmetry sub-sample, respectively. The results are consistent with my previous results as well as with my expectations: the generalist CEO increases overinvestment, and the results are driven by the firms with a higher level of information asymmetry.

Third, if a firm has sufficient cash to finance all the investment projects desired by the CEO, I conjecture that the relationship between the generalist CEO and investment inefficiency is stronger when firms are less financially constrained. I classify firms with positive dividend paying as financially unconstrained firms, and firms which do not pay dividend as financially constrained firms, since financially constrained firms tend to pay lower or no dividends to reduce the necessity of raising external funds in the future (Fazzari et al., 1988). Table 4.6 reports the sub-sample regression results of re-estimating Eq. (3) using three measures of investment inefficiency (INF, UND, and OVR) as dependent variables. I posit that the positive association between the generalist CEO and investment inefficiency is more pronounced when firms are less likely to be subject to financial constraint. I split the sample into two sub-samples based on whether or not the firms are paying a dividend and separately re-estimate the sub-samples. Column (1) and column (2) present the sub-sample regression results, indicating that the coefficients on the Gen-Index are significantly positive only for the dividend paying group. Column (3) through Column (6) of Table 4.7 report the regression results of regressing OVR and UND for my financially constrained firm and financially unconstrained firm sub-samples, respectively. The results are consistent with my previous results as well as with my expectations: the generalist CEO increases overinvestment, and the results are driven by the financially unconstrained firms. Overall, the findings in Table 4.7 are consistent with my main findings, namely, the positive association between the generalist CEO and investment inefficiency is more pronounced for firms with more severe agency conflicts.

The findings depicted in Tables 4.5–4.7, taken together, are consistent with the agency view of investment inefficiency. To summarize, in this section I find that efficacy of governance or external monitoring function has a disciplining role in curbing opportunistic managerial behaviour.

Table 4.8 Generalist CEOs and investment inefficiency: alternative measures of investment inefficiency

This table reports the results from multinomial logit regression estimates when regressing the proxy of the level of unexplained investment on the Gen-Index (generalist CEOs) and other explanatory variables for the 15,130 firm–year observations over the 1993–2006 period. As an alternative proxy for investment inefficiency, I use the proxy for investment inefficiency developed by Biddle et al. (2009) (measured as the residues from regressing total investment on lagged sales growth). The underinvesting group refers to the firm–year observations in the bottom quartile, the overinvesting group refers to the firm–year observations in the top quartile, and the benchmark group refers to the firm–year observations in the middle two quartiles. Panel A of Table 8 reports the results for a multinomial logit model predicting the likelihood that a firm will be in the overinvesting group as opposed to the benchmark group. Models 1–2 report the multinomial logit regression results when regressing the dependent variable on the Gen-Index and Gen_Dummy, respectively. Panel B of Table 8 reports the results for a multinomial logit model predicting the likelihood that a firm will be in the underinvesting group as opposed to the benchmark group. Models 1–2 report the multinomial logit regression results when regressing the dependent variable on the Gen-Index and Gen_Dummy, respectively. All explanatory variables are defined in Appendix A.3 and are measured as of time t–1. I include 2-digit industry and year fixed effects but they are not reported. The t-values are reported in parentheses. The standard errors are clustered by firm level. Financial firms (SIC codes 6000–6999) are excluded from the analysis. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A

VARIABLES	(1) Over-investment versus normal investment	(2) Over-investment versus normal investment
MTB	0.123***	0.124***
	(5.980)	(6.043)
Leverage	0.522***	0.522***
	(3.823)	(3.840)
Cash	0.400**	0.405**
	(2.497)	(2.530)
Tangibility	0.987***	1.000***
	(4.191)	(4.241)
Age	-0.234***	-0.231***
	(-5.589)	(-5.535)
Size	-0.253***	-0.255***
	(-9.141)	(-9.400)
Gen-Index	0.065**	
	(2.036)	
Gen-dummy		0.166***
		(2.821)
Constant	0.917**	0.819**
	(2.550)	(2.317)

Observations	15,130	15,130
Pseudo	0.120	0.121
Industry dummy	Yes	Yes
Year dummy	Yes	Yes

Panel B

VARIABLES	(1) Under- investment versus normal investment	(2) Under- investment versus normal investment
MTB	-0.130***	-0.130***
	(-3.686)	(-3.706)
Leverage	0.800***	0.796***
	(5.400)	(5.390)
Cash	-1.516***	-1.518***
	(-7.311)	(-7.330)
Tangibility	-3.977***	-3.972***
	(-13.441)	(-13.433)
Age	-0.129**	-0.129**
	(-2.508)	(-2.512)
Size	0.022	0.019
	(0.731)	(0.640)
Gen-Index	-0.043	
	(-1.129)	
Gen-Dummy		-0.065
		(-1.004)
Constant	1.333***	1.399***
	(3.101)	(3.279)
Observations	15,130	15,130
Pseudo	0.120	0.121
Industry dummy	Yes	Yes
Year dummy	Yes	Yes

4.6 Alternative measure of investment inefficiency

In this section, I conduct additional analyses to check the robustness of my main findings by using alternative measure of investment inefficiency. I follow Biddle et al. (2009) and estimate the deviations from expected investment to proxy for the magnitude of investment inefficiency. I proceed by first estimating the following firm-specific model of investment as a function of growth opportunities (calculated by sales growth) and use the error term to assess the magnitude of inefficiency:

$$Investment_{i,t} = \beta_0 + \beta_1 Sales\ Growth_{i,t-1} + \varepsilon_{i,t} \quad (4)$$

where $Investment_{i,t}$ is the total investment of firms i in year t, calculated as the net increase in tangible and intangible assets and divided by lagged total assets; $Sales\ Growth_{i,t-1}$ is the percentage of change in sales of firm i from year t–2 to t–1.

I estimate Eq. (4) for each industry–year based on the two-digit SIC codes. The residuals from estimating Eq. (4) reflect the deviations from expected investment. I then sort firms yearly based on residuals from estimating Eq. (4) into quartiles, and classify firm–year observations in the top quartile (i.e., the most positive residuals) as the overinvesting group, firm–year observations in the bottom quartile (i.e., the most negative residuals) as the underinvesting group, and observations in the middle two quartiles are classified as the benchmark group. I use the multinomial logit model to estimate the likelihood that a firm will be in an overinvesting or underinvesting group as opposed to the middle two quartiles. According to my prediction, the firms with generalist CEOs are more likely to be in the top quartile (overinvesting group) of unexplained investment. My set of test variables and control variables are the same as I use in estimating Eq. (3). My dependent variable is based on the magnitude of unexplained investment.

As discussed earlier, if the generalist CEO has higher risk-taking incentives, then I should observe a higher likelihood of overinvesting in the presence of the generalist CEO. Panel A of Table 4.8 reports the multinomial logistic regression results concerning the likelihood that a firm might be in the overinvestment group (residuals from Eq. (4) in the top quantile) as a function of the Gen-Index (generalist CEOs). Model 1 and Model 2 depict the regression results from regressing alternative measure of investment inefficiency on the Gen-Index and Gen-Dummy, respectively. I find that the estimated coefficients on the Gen-Index and Gen-Dummy are both significantly positive. That is, firms featuring CEOs with general managerial skills are more likely to be in the top quantile (overinvestment group) of unexplained investment. These findings are consistent with the findings in Table 4.3. Panel B of Table 4.8 reports the multinomial logistic regression results concerning the likelihood that a firm might be in the underinvestment group (residuals from Eq. (4) in the bottom quantile) as a function of the Gen-Index (generalist CEOs). Model 1 and Model 2 depict the regression results from regressing alternative measures of investment inefficiency on the Gen-Index and Ga-Dummy, respectively. I fail to find a relationship between the presence of a generalist CEO and the likelihood of underinvesting, lending support to my main argument that the association between firms with a generalist CEOs and investment inefficiency is driven by the extra risk-taking by the generalist CEO.

4.7 Conclusion

The previous literature documents that agency problems and information asymmetries are the two principle sources of investment inefficiency. In this paper, using a sample of 15,712 firm–year observations from 1993 to 2006, I examine the relationship between the CEOs with general managerial skills and investment efficiency, and whether such a relationship is stronger for firms with more severe agency conflicts (poorly governed, higher level of information asymmetry, less financially constrained). I find that firms featuring generalist CEOs can deteriorate investment efficiency by expropriating agency problems. In particular, I document that firms featuring CEOs with general managerial skills are only associated with overinvestment, which further support the argument that generalist CEOs are more likely to take more risks compared with their specialist CEO counterparts. This positive association is stronger among firms with poor corporate governance quality, firms with high information asymmetries, and firms that are less financially constrained. My findings are robust when using alternative measure of generalist CEOs, alternative measures of investment efficiency, and several additional tests to address any potential endogeneity concerns.

My study contributes to understanding the role of CEOs with general managerial skills in corporate investment policies. To the best of my knowledge, this is the first study to document that firms featuring general managerial skills are positively associated with investment inefficiency and that this association occurs through the role of generalist CEOs in deteriorating agency problems. These results have empirical implications for CEO selection decisions. Generalist CEOs' tendency to take higher risks should be taken into consideration when firms are hiring a new CEO. Unlike a specialist CEO, a generalist CEO whose incentives are misaligned with the incentives of shareholders may make sub-optimal investment decisions if she believes that she can maximize her personal welfare through investing in value destroying projects.

Appendix A.3 Variable definitions

	Description
Gen-Index	The CEO generality Index developed by Custódio et al. (2013) using the following equation: $Gen-Index_{i,t} = 0.268X1_{i,t} + 0.312X2_{i,t} + 0.309X3_{i,t} + 0.218X4_{i,t} + 0.153X5_{i,t}$ Where X1 represents the number of positions that the CEO has held during her career; X2 represents the number of firms where a CEO has worked; X3 represents the number of industries based on 4-digit SIC code in which the CEO has worked; X4 is an indicator variable set to one if a CEO previously held a CEO position in another firm and zero otherwise; and X5 is an indicator variable set to one if a CEO previously worked in a multi-division conglomerate and zero otherwise.
Gen-Dummy	The indicator variable that equals one if the firm yearly Gen-index is above the median value of the Gen-index.
INEW	The investment is measured by the sum of capital expenditure, R&D expenditure, acquisition and sale of property, plant, and equipment (Itotal) minus amortization and depreciation (IMaintenance) divided by the total assets at the start of the year.
V/P	Growth opportunities of the firm are proxied by the assets in place over the market value of the firm, where assets in place is measured as (1-αγ)BV + α(1 + γ)X- αγd, α=ω/1+γ-ω, γ=12%, ω=0.62, BV is the book value of assets, d is annual dividend, X is operating income after depreciation.
Leverage	The total debts divided by total assets.
Cash	Cash and short-term investment divided by the total assets at the start of year.
Age	The natural log of (1 + the number of years the firm has been listed on the CRSP).
Size	The natural log of total assets at the start of year.
Return	The change of the market value of the firm.
MTB	Market to book ratio. The ratio of market value of assets to the book value of assets.
Tangibility	The proportion of property, plants, and equipment in total assets.
Analyst Coverage	The natural log of (1 + the number of following analysts who issue earnings forecast during the fiscal year).
G-index	An index, used in Gompers et al. (2003), and formed by cumulating the

	indicator variables for each of 24 anti-takeover provisions for each firm.
Investment	The sum of R&D expenditure, capital expenditure, and
Sales growth	The ratio change in sales from year t–2 to t–1.

Chapter 5 Firm-level tournament incentives and the level and valuation of firm cash holdings

5.1 Introduction

I examine the relationship between the promotion-based tournament incentives of the CFO and the level and valuation of firm cash holdings. In addition to having compensation-related incentives, the CFO and other senior executives also face promotion-based tournament incentives, referring to the likelihood of being promoted to the position of CEO (Kale, Reis, and Venkateswaran, 2009). Promotion to the position of CEO offers a permanent increase in total compensation accompanied by enhanced status and perks. In order to increase the likelihood of being promoted to the position of CEO, senior executives exert more effort and take higher risks (Kini and Williams, 2012).

Lazear and Rosen (1981) first proposed the rank order theory, which states that participants compete with each other, and the best relative performer wins the tournament prize. There is an emerging literature that studies the impacts of tournament incentives on the behaviour of senior executives. This literature tends to agree that within-firm tournament incentives have a significant impact on specific corporate decisions. For example, firms with a higher tournament prize proxied by the pay gap between the median-paid president (VP) and the CEO and probability of winning a tournament tend to enhance firm performance and firm risk (Main, O'Reilly, and Wade, 1993; Kale, Reis, and Venkateswaran, 2009; Kini and Williams, 2012). Goel and Thakor (2008) report that executives faced with tournament incentives tend to take greater risks in order to increase their chance of being promoted. Existing research also argues that there is a positive relationship between firm-level tournament incentives and corporate fraud (Haß, Müller, and Vergauwe, 2015). Jia, Tian, and Zhang (2016) also find that firm-level tournament incentives increase corporate patent quantity and quality, innovation efficiency, and patent importance and novelty. Kubick and Masli (2016) find that the tournament incentives of a CFO are positively associated with corporate tax aggressiveness.

I advance this line of inquiry to examine the impact of tournament incentives on corporate risk-taking and financial decisions, and test the extent to which firm-level tournament incentives influence the level and valuation of firm cash holdings. Instead of using the pay gap between CEO compensation and the median value of total VPs' compensation to capture within-firm tournament incentives, I use the pay gap between CEO total compensation and CFO total compensation, because the CFO is the one who is more likely to be involved in firms' financial policies and investment decisions. In addition, recent research provides evidence suggesting that the incentives of a CFO could be more influential in decision making where sophisticated financial and accounting expertise is required. For example, Jiang, Petroni, and Wang (2010) document that CFO equity incentives are more important in determining the magnitude of accruals and the likelihood of beating analyst forecasts than those of the CEO. Again, Kim, Li, and Zhang (2011) document a significant positive relationship between CFOs' option holdings and future crash risk. In contrast, they find only weak evidence that incentives from CEOs' option holdings are related to crash risk, and this weak evidence disappears with the presence of CFO option incentives. Their findings are consistent with earlier research that CFO incentives are more important in situations where sophisticated financial expertise is required.

More recently, scholars have linked the compensation incentives of the CEO to the level and valuation of corporate cash holdings. Liu, Mauer, and Zhang (2014) document a positive relationship between CEO inside debt (pension and deferred compensation) and corporate cash holdings. Further, they find that the marginal value of cash to equityholders declines as CEO inside debt increases, because inside debt tilts managerial incentives to debtholders and helps alleviate competing interests between debtholders and equityholders. Liu and Mauer (2011) examine the impacts of CEO risk-taking (vega) incentives on the level and valuation of corporate cash holdings. They document a positive relationship between CEO risk-taking incentives and corporate cash holdings. They also present a negative relationship between the marginal value of cash and CEO risk-taking incentives, because debtholders anticipate greater risk-taking in firms with higher CEO vega and thus require sufficient liquidity which is more likely to be beneficial to debtholders.

As proposed by Jensen and Meckling (1976), equity-based compensation, and especially stock options, can aggravate risk-shifting incentives, encouraging senior executives to engage in risky projects which increase the market value of equityholders at the expense of debtholders. In a similar manner, I predict that option-like features of intra-organizational CEO promotion tournament incentives increase firm risk, and thus influence the level and value of corporate cash holdings. On the one hand, Coles, Daniel, and Naveen (2006) document that increasing the vega of a CEO's compensation encourages her to pursue riskier projects. Since investing in cash decreases firm-level risk, the option-like features of firm-level tournament incentives would encourage a CFO to hold less cash. On the other hand, within-firm tournament incentives functioning as options exacerbate equityholder–

debtholder conflicts. Debtholders will thus protect themselves by requiring covenants that impose minimum liquidity to compensate costs driven by the greater risk-taking of CFOs. I investigate this question by using a sample of 20,993 firm–years over the period from 1992 to 2014. I find a positive and statistically significant relationship between the tournament incentives of CFOs and corporate cash holdings. I also use the lagged value of the pay gap between the CEO compensation and CFO compensation proxy for a tournament incentive to address the potential endogeneity problem. Importantly, my baseline results are confirmed. Next, I empirically find and evaluate a negative relationship between the tournament incentives of a CFO and the marginal value of cash. In addition, I find that the tournament incentive of CFO and the marginal value of cash relationship is enhanced for firms with a higher leverage ratio, where debtholders are more likely to influence firm decisions. I also explore how a CFO's career horizon and percentage of internally promoted CEOs' ratio influences the tournament incentives of a CFO. I find that the tournament incentive of a CFO is attenuated in firms where the CFO is near retirement age. Again, I find that the tournament incentive of a CFO is moderated by a lower percentage of internally promoted CEOs' ratio.

This paper makes two major contributions. Its main contribution is to the literature on tournament incentives, as I provide strong evidence of the positive effect of tournament incentives of a CFO on corporate cash holdings and the negative effect of tournament incentives of a CFO on valuation of corporate cash holdings. My paper also makes a major contribution to the relatively sparse but growing research that links managerial incentives to corporate liquidity policy (Liu and Mauer, 2011; Liu, Mauer, and Zhang, 2014). I find that tournament incentives encourage senior executives to invest in risky projects and thus exacerbate conflicts between debtholders and equityholders. Debtholders then protect themselves by requiring sufficient liquidity.

The reminder of the paper is organized as follows. Section 2 discusses the related literature and develops the testable hypothesis. Section 3 describes the data sources, sample selection, model specification, and summary statistics. Sections 4–5 discuss the main results and sections 6–8 perform additional tests. Section 9 concludes the paper.

5.2 Literature review and hypothesis development

5.2.1 Tournament incentives

Most of the finance literature that studies managers' risk-taking incentives has primarily focused on the effects of option-like compensation structures on firm financial policies, firm fraud, and firm performance (see e.g. Kini and Williams, 2012; Haß, Müller, and Vergauwe, 2015; Kubick and Masli, 2016). Nevertheless, there is an emerging literature that studies the impact of the promotion-based tournament incentives of senior executives on specific corporate decisions. This literature tends to agree that tournament incentives have a significant impact on these decisions. For example, the tournament incentives of CFOs are positively related to measures of tax aggressiveness (Kubick and Masli, 2016). The CEO and senior executives typically possess incentives based on firm financial outcomes and performance, such as option-based compensation and ownership (Murphy, 1999; Kale, Reis, and Venkateswaran, 2009). In a similar manner, senior executives also face another type of incentive, referred to as the promotion tournament incentive, proxied by the pay differential between the CEO and senior executives. The pay gap between the CEO and subordinate executives is typically very large and has risen steadily, and is not fully explained by managerial product arguments (O'Reilly, 1998). Lazear and Rosen (1981) first proposed the pay gap between the CEO and senior executives as a feature of tournament incentives and studied its influence on firm performance. The basic idea of the tournament incentive is that firms encourage effort from employees by effectively differentiating wages according to different rank orders, giving each the opportunity to win promotion to the highest rank based on relative performance. For subordinate executives, CEO promotion tournament incentives work as an option. Being promoted to CEO's position represents being in the money and the prize is higher pay, perks, and enhanced status (Lazear and Rosen, 1981; Kale, Reis, and Venkateswaran, 2009). Internal promotion-based tournament incentives induce effort from senior executives, leading to improved firm performance. For example, Kale, Reis and Venkateswaran (2009) show that tournament incentives are positively associated with firm performance. Moreover, tournament incentives result in greater project risk-taking by senior executives in order to increase their chances of winning promotion to the rank of CEO. For example, Kini and Williams (2011) find that tournament incentives function similarly to option-based compensation and are positively associated with firm risk, proxied by R&D intensity, firm focus, and leverage. Haß, Müller, and Vergauwe (2015) find that internal tournament incentives result in a higher likelihood of managers engaging in corporate fraud. Park (2016) finds that firms with greater tournament incentives measured by the pay disparities between the CEO and the next layer of executives in the top management team exhibit more earnings management through real activities' manipulation. Kubick and Masli (2016) find that the tournament incentives of CFOs are positively related to different measures of tax avoidance.

5.2.2 Tournament incentives and risk-taking

Goel and Thakor (2008) model the association between tournament incentives and corporate risk-taking. In their model, in a CEO promotion tournament, if each manager chooses the same risk level as her competitors, she has the same output as her competitors. The likelihood of being promoted to CEO will be the same for all managers since their abilities are ex ante identical. A manager can increase her promotion likelihood by increasing her project risk. The intuition here is that extreme outcomes will be more likely be manifested by greater project risk. The manager who takes more risk than his competitors increases his own promotion probability, because higher risk leads to more extreme payoffs more likely even when the mean outcomes remain the same. As a result, an output higher than those of their competitors makes the manager most likely to be promoted, since the board members cannot distinguish what has resulted in higher project payoff, the superior managers' ability or higher project risk (Kini and Williams, 2012). In such a tournament scheme, managers are likely to take on greater risk than they would in absence of tournament incentives to increase their chance of promotion to the rank of CEO. In turn, greater incentives lead to higher levels of firm risk-taking.

5.2.3 Tournament incentives and cash

The focus of my paper is, however, on whether tournament incentives influence the level and valuation of firms' cash holdings. There are three streams of research that have examined the influence of tournament incentives on firm cash holdings.

Alignment hypothesis

The option-like features of intra-organizational CEO promotion tournament incentives work as extra compensation for risk-averse and under-diversified managers to pursue riskier projects and financing policies, which aligns the interests of managers and shareholders. Since investment in cash decreases overall firm risk, an increase in tournament incentives will lower cash holdings.

Precaution motive (or costly external finance hypothesis)

Firms hold cash to protect against adverse shocks when they have difficulty in raising capital or access to external funds is costly. Consistent with this theory, Opler et al. (1999) find that firms with significant growth opportunities, firms with riskier activities, and smaller firms have substantially larger cash balances than other firms. In line with this argument, Bates, Kahle, and Stulz (2009) document that a dramatic increase in the cash ratio is positively associated with less working capital, riskier cash flows, and higher research and development (R&D) expenditure.

In my setting, firms that encourage greater risk-taking with high tournament incentives could have difficulty raising external capital or face a higher cost of external funds. As a result, firms with higher tournament incentives will build a larger cash balance to hedge their future financing needs. Thus, I predict a positive relationship between the cash balance and tournament incentives.

Costly contracting hypothesis

The costly contracting hypothesis, on the other hand, suggests that creditors could rationally predict that firms with greater tournament incentives will pursue higher-risk projects and increase firm-level risk generally. To limit excess risk-taking by managers, maintaining sufficient liquidity and mitigating agency problems between shareholders and bondholders, creditors could require restrictive covenants, such as minimum working capital requirements and a minimum cash flow coverage ratio, which constrains firms to retain certain internal funds. In sum, consistent with the costly contracting theory, I predict a positive relationship between cash holding and tournament incentives.

The alignment incentive predicts a negative relationship between the level of cash holdings and tournament incentives, while both costly external financing theory and costly contracting theory predict a positive relationship between the level of cash holdings and tournament incentives. This allow us to disentangle the relationship between the level of cash holdings and tournament incentives. In addition, costly contracting theory and costly external finance theory have opposite predictions about the impact of tournament incentives on the value of cash. The costly contracting theory predicts that greater tournament incentives lower the value of cash to shareholders, since debtholders could require restrictive covenants to protect themselves from exposure to the greater risk induced by higher firm-level tournament incentives, and thus debtholders are more likely to benefit from an additional value of cash in firms with greater tournament incentives. On the other hand, costly external finance theory predicts that greater tournament incentives will cause an additional value of cash to shareholders, because with sufficient internal funds firms are unlikely to miss positive net present value (NPV) projects. To examine the relationship between tournament incentives and the additional value of cash can help us to distinguish which theory is the driving force if tournament incentives and the level of cash holding are positively related.

5.3 Data and descriptive statistics

My sample is compiled from several sources. The initial sample consists of all ExecuComp firms from 1992 to 2014. The ExecuComp database provides detailed compensation information for top executives. I include a firm–year observation in the sample if ExecuComp lists both CEO and CFO compensation information. I exclude utilities and financial firms (Standard Industrial Classification (SIC) codes between 4900–4999 and 6000–6999, respectively). I obtain firm-specific accounting variables from Compustat files and stock return data from the Centre for Research in Security Prices (CRSP) files. I calculate Pay gap, CEO delta (CFO delta), and CEO vega (CFO vega) as measures of internal tournament incentives, CEO (CFO) alignment incentives, and CEO (CFO) risk-taking incentives, respectively. I further require sample firm–years to have the necessary data to compute CEO (CFO) delta and vega incentives. I obtain a final sample of 20,993 firm–years observations.

Table 5.1 provides descriptive statistics for the variables used in my cash holdings' regressions. All variables are winsorized at their 1% and 99% values. The variables are defined as follows.

Table 5.1 Descriptive statistics

The table below presents descriptive statistics of firm-level tournament incentives and firms' cash holdings that are used in my analysis. The sample consists of 20,993 firm-year observations from 1992-2014 where data are available to compute CEO/CFO compensation incentives and tournament incentives of CFO on Execucomp database and where accounting data are available on Compustat. Cash is corporate cash holdings defined as the ratio of cash and markable securities to net assets. Firm size is the natural logarithm of the book value of net assets. Market-to-book is the ratio the market value of net assets to the book value of net assets. Cash flow/net assets is the ratio of earnings after interest, dividends, and taxes but before depreciation to the book value net assets. NWC/net assets is defined as the ratio of net working capital minus cash and marketable securities to the book value of net assets. Capex/net assets is defined as the ratio of capital expenditures to the book value of net assets. Leverage is defined as the ratio of the sum of long-term debt and debt in current liabilities to the book value of net assets. Dividend Dummy is an indicator variable equals to one if the frim paid a common dividend and zero otherwise. Acquisition activity is the ratio of expenditures on acquisitions to the book value of net assets. R&D/sales is the ratio of research and development expenses to net assets, and R&D/sales is set equal to zero if research and development expenses is missing. Bebchuk, Cohen, and Ferrell index (E-index) documents incidence of six out of 24 antitakeover provisions and varies from zero to six. Vega is the dollar change in a CEO's /CFO's wealth for 0.01 change in the standard deviation of returns. Delta is the dollar change in a CEO's /CFO's wealth for a 1% change in stock change in stock price. Pay Gap is the difference of total compensation between CEO and CFO.

VARIABLES	N	Mean	Std.Dev.	25th	Median	75th
Log(1+CEOdelta) (in 000s)	20,993	5.303	1.460	4.370	5.281	6.253
Log(1+CEOvega) (in 000s)	20,993	3.694	1.725	2.739	3.877	4.906
Log(Pay Gap) (in 000s)	20,993	7.416	1.232	6.602	7.477	8.293
Log(1+CFOdelta) (in 000s)	20,993	3.543	1.327	2.667	3.587	4.463
Log(1+CFOvega) (in 000s)	20,993	2.549	1.399	1.595	2.600	3.529
Cash	20,989	0.268	0.465	0.028	0.098	0.289
Firm size	20,989	7.036	1.641	5.905	6.955	8.105
Market-to-book	20,989	2.479	2.470	1.256	1.694	2.596
Cash flow/net assets	20,989	0.099	0.139	0.062	0.099	0.147
NWC/net assets	20,989	0.078	0.191	-0.025	0.077	0.196
Capex/net assets	20,989	0.067	0.063	0.026	0.047	0.084
Leverage	20,989	0.247	0.216	0.0612	0.226	0.362
Dividend Dummy	20,993	0.485	0.500	0.000	0.000	1.000
Acquisition activity	20,989	0.033	0.072	0.000	0.000	0.028
R&D/sales	20,976	0.049	0.108	0.000	0.003	0.050
E-index	10,664	2.715	1.261	2.000	3.000	4.000

Table 5.2 Pearson correlation coefficients

This table reports Pearson correlation coefficients between the variables in my main analysis. Utilities (SIC codes 4900-4999) and financial firms (SIC codes 6000-6999) are excluded. Correlation coefficients with an asterisk are significant at least at 5% level.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Cash	1.000														
Log(1+CEOdelta)	-0.003	1.000													
Log(1+CEOvega)	-0.017*	0.534*	1.000												
Log(Pay Gap)	-0.072*	0.435*	0.511*	1.000											
Log(1+CFOdelta)	-0.020*	0.657*	0.570*	0.442*	1.000										
Log(1+CFOvega)	-0.015*	0.506*	0.814*	0.405*	0.756*	1.000									
Firm size	-0.441*	0.418*	0.448*	0.604*	0.480*	0.454*	1.000								
Market-to-book	0.612*	0.242*	0.064*	0.026*	0.231*	0.097*	-0.301*	1.000							
Cash flow/net assets	-0.101*	0.220*	0.086*	0.093*	0.208*	0.119*	0.062*	0.129*	1.000						
NWC/net assets	-0.248*	-0.136*	-0.161*	-0.196*	-0.149*	-0.148*	-0.158*	-0.196*	0.154*	1.000					
Capex/net assets	0.076*	0.042*	-0.073*	-0.089*	0.012	-0.055*	-0.109*	0.165*	0.125*	-0.150*	1.000				
Leverage	-0.098*	-0.025*	0.059*	0.124*	0.011	0.033*	0.249*	-0.107*	-0.210*	-0.245*	-0.040*	1.000			
Dividend Dummy	-0.248*	0.113*	0.111*	0.163*	0.112*	0.124*	0.379*	-0.138*	0.011	0.048*	-0.071*	0.022*	1.000		
Acquisition activity	-0.050*	0.035*	0.016*	0.019*	0.046*	0.015*	-0.013	-0.034*	0.009	-0.017*	-0.150*	0.045*	-0.054*	1.000	
R&D/sales	0.576*	-0.025*	0.056*	-0.040*	0.004	0.048*	-0.296*	0.399*	-0.400*	-0.211*	0.008	-0.032*	-0.259*	0.045*	1.000

Cash holdings

To test for the relationship between the level of cash holdings and tournament incentives, I adopt Opler et al.'s (1999) definition of cash holdings as the ratio of cash and marketable securities (CHE) to net assets, where net assets equals to total asset (AT) minus cash and cash and marketable securities (CHE).

Tournament incentives

I measure tournament incentives as the difference between the CEO's total compensation and the total compensation paid to the CFO (pay gap). The total compensation package for the CEO and the CFO is obtained from Execucomp variable TDC1. This variable is a reasonable proxy for a firm's tournament incentives because it roughly captures the increase in a senior executive's salary if he wins a promotion tournament. I remove year observations where the pay gap between the CEO and the CFO is negative. My final sample consists of 20,993 firm–year observations.

CEO and CFO equity incentives and risk-taking incentives (vega and delta)

Liu and Mauer (2011) find that a CEO's equity incentives (vega) is positively associated with cash holding and negatively associated with the value of cash. Thus, I control for CEO and CFO equity incentives and their risk-taking incentives by constructing both the CEO's delta and vega and the CFO's delta and vega, respectively. Following Coles, Daniel, and Naveen (2006), I measure delta as the dollar increase in portfolio wealth for a 1% change in the stock price and construct vega as the dollar change in value of portfolio wealth for a 1% change in the standard deviation of stock volatility. Also, I assume that the vega of all stockholding, including restrictive stock, is ignored, because the vega incentives provided by stocks are insignificant when compared with the vega incentives provided by options.

Control variables

I control for variables found in the earlier literature that impact the level of cash holdings (Opler et al., 1999; Bates, Kahle and Stulz, 2009). Firm size is calculated as the natural logarithm of net assets. I measure firms' book to market ratio as the book value of assets minus the book value of equity plus the market value of equity, all deflated by the book value of net assets. I define NWC/net assets as working capital less cash and marketable securities divided by net assets. Capex/net assets is measured as the ratio of capital expenditure to net assets. I use the ratio of the sum of long term-debt and debt in current liabilities to the book value of net assets as the measure of leverage. The dividend dummy equals 1 for firms that pay common dividends during a fiscal year and 0 otherwise. R&D/sales is the ratio of R&D expenses to total sales. Cash flow/net assets is the ratio of earnings after interest, dividends and taxes but before depreciation scaled by the book value of net assets. I measure acquisition activity as the ratio of expenditure on acquisitions to the book value of net assets.

Table 5.1 presents descriptive statistics of the variables used in this study. On average, cash holding in my final sample is large, at 26.8% of net assets, and the median of cash holding is 9.8% of net assets. The CEOs' compensation incentive is greater than CFOs' compensation incentive. The mean tournament incentives, measured as the natural logarithm of the CEO/CFO pay gap, are 7.416 ($1.662 million). Regarding control variables, the mean (median) value of the firm leverage ratio and the market-to-book (MB) ratio in my final sample are 0.247 (0.226) and 2.479 (1.694), respectively.

Table 5.2 reports the Pearson correlation coefficients among the variables. Interestingly, the correlations between vega, tournament incentives, and cash holding are negative. Of course, this may be a premature conclusion since CEO (CFO) compensation incentives, tournament incentives, and cash holdings are strongly correlated with firm size and MB ratio, and they are highly correlated with many other control variable.

5.4 Tournament incentives and cash holdings

Table 5.3 contains the results from my investigation of the relationship between tournament incentives and cash holdings in which Cash/Net Assets is the dependent variable and tournament incentives Log (Pay Gap) is the test variable of interest. Industry and year fixed effects are included in all regressions (i.e. two-digit SIC code dummies and year dummies), and the t-statistics in parenthesis below the parameter estimates are based on heteroscedasticity robust standard errors, corrected for correlation across observations for a given firm. Models 1–2 include delta, vega, and tournament incentives, Model 3 reports the regression rsults from two-stage least squares (2SLS) estimation. Model 4 includes vega and tournament incentives, Model 5 includes only tournament incentives, and Models 6–7 separately report the regressions of cash holdings on firm-level tournament incentives after dividing my observations into two sub-samples of firms with strong corporate governance and firms with weak corporate governance. Firms with strong corporate governance are firms that report a Bebchuk, Cohen, and Ferrell (2009) index (E-index) value in the bottom 50^{th} percentile. Separately, I classify firms as having weak corporate governance for observations that report a Bebchuk, Cohen, and Ferrell index (E-index) value in the top 50^{th} percentile.

Model 1 in Table 5.3 presents results from regressing the cash holdings (Cash/net Assets) on tournament incentives (Log(Pay Gap)). The regression results show that the firm level of tournament incentives of the CFO is a significant predictor of a firm's cash holdings. I find that the coefficient on tournament incentives (Log(Pay Gap)) is positive and significant at the 1% level. In other words, firms with higher internal tournament incentives have a higher level of cash holdings. These results also indicate that additional cash holdings are an important economic consequence of tournament incentives. For example, one standard deviation increase in the logarithm of tournament incentives leads to a 3.5% (0.028*1.232) increase in the level of corporate cash holdings. In terms of control variables, the findings are consistent with Opler et al. (1999) and Harford, Mansi, and Maxwell (2012). I find that larger firms, firms with higher working capital, firms with greater capital expenditures, and firms with greater acquisition activities generally hold less cash. In contrast, the coefficients on the MB ratio, the ratio of R&D expenses to total sales (R&D) are positive and significant at the 1% level, which is consistent with the earlier literature suggesting that firms with greater growth opportunities tend to hold more cash. Finally, I find that the coefficient on the CFO's equity incentive (vega) is positive and significant at the 1% level, which provides confirmation that I am capturing a distinct relationship between tournament incentives that are incremental to equity incentives. To control for the potential endogeneity of tournament incentives and compensation incentives, I follow Harford, Mansi, and Maxwell (2012) by lagging governance variables. Model 2 in Table 5.3 presents the relationship between lagged tournament incentives and the firm's cash holdings.

Again, I find that the coefficient on internal tournament incentives (Log (Pay Gap)) is positive and significant. Model 3 reports the regression results from the two-stage least squares (2SLS) estimation. My tournament variable (Log(Pay Gap)) and four incentive variables (i.e., CEO delta (vega), CFO delta (vega)) could be endogenous since both tournament and incentive alignment proxies are related to managerial compensation. Following Kini and Williams (2012), my instrument for firm-level tournament incentive is the median value of the tournament variable of firms in the same 2-digit SIC code and size quartile. Similarly, I employ the median values of incentives measures of firms in the same 2-digit SIC code and size quartile as the instruments for manager's incentive variables. The coefficient on industry-median level of tournament incentive is positive and significant at 1% level, which consistent with my baseline regression results.

Models 4–5 in Table 5.3 present cash regressions analogous to Models 1–2, except that I exclude the delta incentives of the CEO and CFO in Model 3 and exclude both the delta and vega incentives of the CEO and CFO in Model 4. The results excluding the delta incentives of the CEO and CFO are consistent with the main findings from Models 1–2. Again, in two specifications, the coefficient on tournament incentives (Log(Pay Gap)) is positive and significant at the 1% level. In addition, the coefficient on CFO vega is also significant and positive at the 1% level. The coefficient on CEO vega is insignificant, which is consistent with recent research findings that the incentives of a CFO could be more influential in decision-making where sophisticated financial and accounting expertise is required. Overall, although tournament incentives are positively related to the delta and vega, each measures different aspects of managers' incentives. In particularly, the impact of tournament incentives on cash holdings is distinct from the influence of compensation incentives (delta and vega) on cash holdings. Furthermore, tournament incentives are incremental to compensation incentives (delta and vega). Models 6–7 in Table 5.3 present cash regressions analogous to Model 1, except that I divide my observations into strong and weak corporate governance sub-samples based on firms' E-index scores. In both strong and weak corporate governance specifications, I find that tournament incentives are positively and significantly related to corporate cash holdings. In the strong corporate governance sub-sample, I find that a one standard deviation increase in the logarithm of tournament incentives increases cash holdings by 0.001 or about 3.6% (based on a regression sample mean for cash holdings of about 0.27). In the weak corporate governance sub-sample, I find that a one standard deviation increase in the logarithm of tournament incentives increases cash holdings by 0.02 or about 9.2% (based on a regression sample mean for cash holdings of about 0.22). Comparing the regression results between the strong corporate governance sub-sample and the weak corporate sub-sample, I find that a positive relationship between tournament incentives and corporate cash holdings is attenuated in the presence of a strong corporate governance structure. Overall, there is strong and consistent evidence across all eight regressions that corporate cash holdings increase with tournament incentives, independent of managers' compensation incentives. My findings are consistent with both costly external finance theory and costly contracting theory. Firms with strong corporate governance structures tend to limit managerial rent extraction and enhance shareholder protection and hence attenuate the positive relationship between cash holdings and tournament incentives.

Table 5.3 Tournament incentives and cash holdings

The table below presents the regression results of the impacts of firm-level tournament incentives on the corporate cash holdings. The dependent variable is the ratio of cash plus marketable securities to the book value of net assets. Model 1-2 regress cash holdings of year t on both CEO/CFO compensation incentives and firm level tournament incentives in year t, and both CEO/CFO compensation incentives and firm level tournament incentives of year t-1, respectively. Model 3 reports two-stage least squares estimation which regress cash holdings on predicted CEO vega (delta) incentives, CFO vega (delta) incentives and firm level tournament incentive. Model 4-5 are the same except I exclude CEO/CFO delta and CEO/CFO compensation incentives, respectively. Model 6-7 present the subsample analysis of the effect of tournament incentives on corporate cash holdings. Firms with strong corporate governance are the firms that report a Bebchuk, Cohen, and Ferrell index (E-index) value in the bottom 50^{th} percentile. ***, **, and * indicate two tailed significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	OLS	OLS	2SLS	OLS	OLS	strong	weak
Log(1+CEOdelta)	0.006		0.014			-0.003	-0.001
	(1.367)		(1.546)			(-0.350)	(-0.245)
Log(1+CEOvega)	-0.006		-0.003	0.000		-0.003	0.002
	(-1.412)		(-0.358)	(0.046)		(-0.376)	(0.447)
Log(Pay gap)	0.028***		0.034***	0.027***	0.028***	0.012*	0.028***
	(6.138)		(3.430)	(5.670)	(5.864)	(1.658)	(4.533)
Log(1+CFOdelta)	-0.025***		-0.017			-0.030***	-0.012**
	(-5.127)		(-1.571)			(-3.452)	(-1.982)
Log(1+CFOvega)	0.030***		0.040***	0.013***		0.020**	0.014**
	(5.662)		(3.620)	(2.838)		(2.264)	(2.164)
Firm size	-0.097***	-0.097***	-0.115***	-0.101***	-0.095***	-0.070***	-0.090***
	(-15.054)	(-14.095)	(-9.939)	(-16.896)	(-17.557)	(-7.283)	(-10.922)
Market to book	0.070***	0.074***	0.066***	0.068***	0.069***	0.080***	0.059***
	(16.722)	(14.978)	(13.294)	(17.818)	(18.379)	(10.816)	(9.527)
Cash flow/net assets	0.035	-0.001	-0.002	0.026	0.041	0.303**	0.107
	(0.525)	(-0.011)	(-0.030)	(0.401)	(0.614)	(2.413)	(1.054)
NWC/net assets	-0.456***	-0.443***	-0.455***	-0.460***	-0.461***	-0.441***	-0.339***
	(-10.181)	(-8.855)	(-10.080)	(-10.247)	(-10.260)	(-6.074)	(-5.486)
Capex/net assets	-0.220**	-0.242**	-0.238**	-0.235**	-0.236**	-0.246*	-0.035
	(-2.371)	(-2.308)	(-2.539)	(-2.528)	(-2.534)	(-1.751)	(-0.286)
Leverage	0.001	-0.006	0.016	0.003	-0.002	0.035	0.029
	(0.029)	(-0.154)	(0.421)	(0.092)	(-0.051)	(0.742)	(0.707)
Dividend Dummy	0.001	0.001	0.003	0.004	0.004	0.005	-0.013
	(0.149)	(0.081)	(0.344)	(0.399)	(0.400)	(0.337)	(-1.063)
Acquisition activity	-0.390***	-0.382***	-0.410***	-0.406***	-0.405***	-0.454***	-0.366***
	(-10.981)	(-9.310)	(-10.718)	(-11.513)	(-11.465)	(-6.847)	(-7.745)
R&D/sales	1.204***	1.269***	1.159***	1.206***	1.231***	1.429***	1.401***
	(11.838)	(10.799)	(11.637)	(11.818)	(12.051)	(6.754)	(9.149)
Lag (Log(1+CEOdelta))		0.010**					
		(2.095)					
Lag (Log(1+CEOvega))		-0.005					
		(-1.132)					

Lag (Log(Pay Gap))		0.027***					
		(5.221)					
Lag (Log(1+CFOdelta))		-0.015***					
		(-3.017)					
Lag (Log(1+CFOvega))		0.022***					
		(3.728)					
Constant	0.538***	0.519***	0.562***	0.557***	0.523***	0.484***	0.475***
	(8.339)	(6.641)	(8.036)	(8.609)	(8.321)	(5.967)	(7.171)
Observations	20,974	16,374	20,974	20,974	20,974	4,908	5,751
Adjusted R-squared	0.602	0.603	0.599	0.601	0.600	0.563	0.578
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes

5.5 Tournament incentives and value of cash

Based on my regression results in Table 5.3, I report a positive relationship between internal tournament incentives and corporate cash holdings. Although my findings are inconsistent with alignment theory, they are consistent with both costly external financing theory and costly contracting theory. The costly external financing theory contends that it is difficult to obtain external financing for firms that encouraging higher risk-taking with greater tournament incentives. In turn, costly contracting theory argues that reasonable debtholders could require covenants in firms that encouraging risk-taking by offering senior executives greater tournament incentives and providing a cushion in case of financial distress. Although both costly external financing theory and costly contracting theory predict a positive relationship between tournament incentives and corporate cash holdings, they offer different explanations for the positive relationship between tournament incentives and cash holdings. In costly external financing theory, firms hold more cash to hedge future external financing needs. Alternatively, in costly contracting theory, firm hold more cash to meet the demand from debtholders.

In order to distinguish between costly external financing theory and costly contracting theory to better understa what drives the positive relationship between cash holdings and tournament incentives, I examine the impact of tournament incentives on the value of cash to equityholders. Costly external financing theory argues that the value of cash is increasing with tournament incentives, since cash is used to hedge external financing needs and hence benefit equityholders. In turn, costly contracting theory predicts that the value of cash decreases with tournament incentives, because cash is used to meet the demands of debtholders and thus benefit them. Both theories can be examined in the data, thus the effect of tournament incentives on the value of cash can help us to distinguish between the two competing theories.

To examine the value of corporate cash holdings, I follow the research design implemented in the earlier literature (Faulkender and Wang, 2006; Dittmar and Mahrt-Smith, 2007; Denis and Sibilkov, 2010; Harford, Klasa, and Maxwell, 2014). I estimate my primary model which augments the experimental design in Faulkender and Wang (2006) by regressing excess stock returns on the change in cash in the presence of managers' tournament incentives and compensation incentives while controlling for the changes in a host of other firm-specific factors to affect shareholder wealth:

$$r_{i,t} - R_{i,t}^{B} = \gamma_0 + \gamma_1 \frac{\Delta E_{i,t}}{M_{i,t-1}} + \gamma_2 \frac{\Delta NA_{i,t}}{M_{i,t-1}} + \gamma_3 \frac{\Delta RD_{i,t}}{M_{i,t-1}} + \gamma_4 \frac{\Delta I_{i,t}}{M_{i,t-1}} + \gamma_5 \frac{\Delta D_{i,t}}{M_{i,t-1}} + \gamma_6 \frac{C_{i,t-1}}{M_{i,t-1}} + \gamma_7 L_{i,t} + \gamma_8 \frac{NF_{i,t}}{M_{i,t-1}} + \gamma_9 \frac{C_{i,t-1}}{M_{i,t-1}} \times \frac{\Delta C_{i,t}}{M_{i,t-1}} + \gamma_{10} L_{i,t} \times \frac{\Delta C_{i,t}}{M_{i,t-1}} + \gamma_{11} Log(1 + CEOvega)_{i,t} + \gamma_{12} Log(1 + CEOdelta)_{i,t} + \gamma_{13} Log(1 + CFOvega)_{i,t} + \gamma_{14} Log(1 + CFOdelta)_{i,t} + \gamma_{15} Log(Pay\ \ Gap)_{i,t} + \gamma_{16} Log(1 + CEOvega)_{i,t} \times \frac{\Delta C_{i,t}}{M_{i,t-1}} + \gamma_{17} Log(1 + CEOdelta)_{i,t} \times \frac{\Delta C_{i,t}}{M_{i,t-1}} + \gamma_{18} Log(1 + CFOvega)_{i,t} \times \frac{\Delta C_{i,t}}{M_{i,t-1}} + \gamma_{19} Log(1 + CFOdelta)_{i,t} \times \frac{\Delta C_{i,t}}{M_{i,t-1}} + \gamma_{20} Log(Pay\ Gap)_{i,t} \times \frac{\Delta C_{i,t}}{M_{i,t-1}} + \varepsilon_{i.t} \qquad (5.1)$$

The dependent variable is the excess stock return, measured as buy-and-hold returns for the sample company minus that of a size and BM matched benchmark over 12 months ending at the fiscal year-end date. Specifically, I group my sample firms in to one of 25 value-weighted size and MB benchmark portfolios as of June of each year t. The benchmark portfolios are 25 Fama–French portfolios formed from the five size quintiles using the market capitalization of NYSE firms as of June 30 of each year and five BM quantiles are formed from NYSE firms as of December of the previous year. When a sample firm is delisted, the delisting value is reinvested into the benchmark (Fich, Harford, and Yore, 2016). After identifying one of the 25 Fama–French portfolios as the corresponding benchmark portfolio for each firm–year observation based on the intersection between size and BM independent sorts, the returns of the Fama–French portfolios are regarded as the benchmark return.

I define the independent variables in Equation (5.1) following Faulkender and Wang (2006). Each of the change variables indicates a change in variables in X for firm *i* from year t–1 to year t, where the deflating variable, $M_{i,t-1}$, is firm i's market value of at time t–1 computed as the price at the end of the previous year (PRCC_F) multiplied by the common shares outstanding at the end of the previous year (CSHO). The right-hand side independent variables include cash and marketable securities ($C_{i,t}$), earnings before extraordinary items ($E_{i,t}$), net assets ($NA_{i,t}$), R&D expenses ($RD_{i,t}$), interest expenses ($\mathrm{I}_{i,t}$), common dividends ($D_{i,t}$), leverage equal to long-term debt plus debt in current liabilities deflated by the lagged market value of equity ($L_{i,t}$), and net finance equal to net new equity issues and net new debt issues ($N_{i,t}$).

The interaction between tournament incentives and the change in cash balances represents the test variable of interest. The coefficient on the interaction of the tournament incentives with the change in cash reflects the impact of tournament incentives (CFO risk-taking incentives) on the change in the marginal value of cash (Log(pay Gap) *($\Delta C_{i,t}/M_{i,t-1}$))(i.e γ_{20}). The coefficients on managers' tournament incentives and compensation incentives directly reflect the influence of managers' incentives on excess stock returns. Based on costly external financing theory, I expect the sign of γ_{20} to be positive in Equation (5.1), implying that the value of cash is higher in firms with higher internal tournament incentives, because costly external financing theory contends that an additional dollar of cash helps to hedge future external financing needs. Alternatively, costly contracting theory predicts the sign of γ_x to be negative in Equation (5.1), indicating that the value of cash is lower in firms with lower internal tournament incentives, because costly contracting theory argues that an additional value of cash is beneficial to debtholders. The option-like features of intra-organizational CEO promotion tournament incentives offer senior executives incentives to increase firm risk. Being promoted to the rank of CEO means being in the money and the prize is the increase in compensation accompanied by higher status and larger compensation. Thus, tournament incentives function as vega in terms of risk-taking incentives. Then, I interpret the coefficients on (Log(1+CEO vega) *($\Delta C_{i,t}/M_{i,t-1}$)) and (Log(1+ CFO vega) *($\Delta C_{i,t}/M_{i,t-1}$)), which capture the effect of the compensation incentives of the CEO and CFO on the marginal value of cash, in a similar manner. The coefficients on (Log(1+ CEO delta) *($\Delta C_{i,t}/M_{i,t-1}$)) and (Log(1+ CFO delta) *($\Delta C_{i,t}/M_{i,t-1}$)), which measure the effects of CEO pay-for-performance incentives on the value of an additional dollar of cash, are interpreted similarly. The positive signs for γ_{18} and γ_{20} indicate that delta enhances shareholder–manager alignment. On the contrary, the negative signs for γ_{18} and γ_{20} imply that higher delta compensation increases CEO risk-aversion, leading to sub-optimal cash holdings.

Table 5.4 reports the regression results from estimating Equation (5.1). Models 1–2 in Table 5.4 present the baseline regression results that replicate the specification in Faulkender and Wang (2006), and the results I obtain are very similar to theirs. Using the coefficient estimates in Model 2, I find that an extra dollar of cash increases shareholder wealth by $1.086. The estimates in Model 2 imply that the marginal value of cash for a firm is approximately $1.766 if the firm has zero cash and leverage. Furthermore, I also report that the marginal value of cash decreases with leverage and liquidity that is consistent with Faulkender and Wang (2006), indicating that there is nothing unusual about my sample.

Models 3–5 in Table 5.4 augment the specification in Model 2 by including CEO and CFO compensation incentives, and internal tournament incentives. Model 3 in Table 5.4 estimates Equation (5.1) by including both managers' compensation incentives (delta and vega) and tournament incentives. Model 4 in Table 5.4 estimates Equation (5.1) by including managers' vega incentives and tournament incentives, and Model 5 in Table 5.4 estimates Equation (5.1) by including only tournament incentives. Although Models 3–5 in Table 5.4 have different specifications, the coefficient on my test variable interaction term (Log(Pay gap*($\Delta C_{i,t}/M_{i,t-1}$)) is negative and significant in all models in which that variable is used, indicating that the value of cash holdings is higher in firms with higher risk incentives. The negative sign of the interaction term (Log(Pay gap))*($\Delta C_{i,t}/M_{i,t-1}$) is consistent with costly contracting theory, which contends that a positive relationship between cash holding and tournament incentives is driven by cash reserves and thus an additional dollar benefits debtholders more than equityholders when firms have higher tournament incentives. In Model 3 of Table 5.4, an additional dollar impacts a firm's excess return through the item $\Delta C_{i,t}$ and interaction terms (i.e. Log(1+ CEO delta) *($\Delta C_{i,t}/M_{i,t-1}$), Log(1+ CFO delta) *($\Delta C_{i,t}/M_{i,t-1}$), Log(1+ CEO vega) *($\Delta C_{i,t}/M_{i,t-1}$), Log(1+ CFO vega)

*($\Delta C_{i,t}/M_{i,t-1}$), Log(Pay Gap) *($\Delta C_{i,t}/M_{i,t-1}$), ($C_{i,t-1}/M_{i,t-1}$)*($\Delta C_{i,t}/M_{i,t-1}$), $L_{i,t}$*($\Delta C_{i,t}/M_{i,t-1}$)). I use the coefficients of these items to obtain the marginal value of cash as follows. The mean firm has a Log (1+ CEO delta) equal to 5.324, a Log(1+ CEO vega) equivalent to 3.714, a Log(1+ CFO delta) equal to 3.560, a Log(1+ CFO vega) equivalent to 2.566, a Log(Pay Gap) equal to 7.414, a lag of cash holdings equal to 13.12% of the market value of equity, and a mean leverage ratio of 18.85%. Thus, the marginal value of one dollar to equityholders of the mean firms is 1.248 (=1.878+(5.324*0.056)+(3.714*0.068)+(3.560*0.429)+(2.566*(-0.398))+(7.414*(-0.203))+(13.12%*(-0.809))+(18.85%*(-0.401)). I find that the coefficient of the interaction term, Log(Pay Gap) *($\Delta C_{i,t}/M_{i,t-1}$), is –0.203 (t = –4.399) in Model 3. The univariate data shows that a one standard deviation increase in the logarithm of internal tournament incentives leads to a $0.250 decrease (-0.203*1.230) in the value of an additional dollar. Thus, it appears as if tournament incentives have a significant economic effect on the marginal value of cash. While I find that coefficients on CEO compensation incentives (delta and vega) interacting with the change in cash are not significant, the coefficients on CFO compensation incentives (delta and vega) interacting with the change in cash are both significant. My findings are consistent with earlier research that CFO incentives are more important in situations where sophisticated financial expertise is required. In particular, I find that the coefficient on CFO vega interacting with the change in cash is negative, supporting costly contracting theory that an extra dollar of cash benefits debtholders more than equityholders when the managers have higher vega compensation. In addition, I find that the coefficient on CFO delta interacting with the change in cash is positive, indicating that enhanced alignment of management and shareholder interests increases equityholders' valuation of cash.

To further examine the impact of tournament incentives on the value of cash holdings, I partition the sample into two groups. One group contains observations with strong corporate governance structures (corporate governance index < median), and the other group contains the rest of the observations. Models 6–7 in Table 5.4 present the regression results of the strong corporate governance sub-sample and the weak corporate governance sub-sample, respectively. I find that the coefficient on my test variable interaction term (Log(Pay Gap) *($\Delta C_{i,t}/M_{i,t-1}$)) is only negative and significant for the weak corporate governance sub-sample of firms. Separately, I find that the coefficient on (Log(Pay Gap) *($\Delta C_{i,t}/M_{i,t-1}$)) is not significant for the strong corporate governance sub-sample of firms. One possible explanation for my findings is that shareholder rights in firms with weak corporate governance are not well protected and thus agency conflicts between shareholders and equityholders are intensified. Taken together, the evidence shows that higher internal tournament incentives are perceived to be problematic only for firms with weak corporate governance structures in place. Strong corporate governance is viewed as alleviating the agency conflicts between debtholders and equityholders, and hence equityholders do not discount the value of firm cash holdings.

Table 5.4 Tournament incentives and value of cash

The table below presents the regression results of the impacts of firm-level tournament incentives on the marginal value of cash. The dependent variable in each model is the excess stock return. Models 1-2 present the baseline regression results which replicate the specification in Faulkender and Wang (2006), and the results I obtained are very similar to theirs. Model 3-5 include CEO/CEO compensation incentives (vega and delta) and firm-level tournament incentives, CEO/CFO vega incentives and firm-level tournament incentives, and only firm-level tournament incentives, respectively. Model 6-7 present the subsample analysis of the effect of tournament incentives on marginal value of cash. Firms with strong corporate governance are the firms that report a Bebchuk, Cohen, and Ferrell index (E-index) value in the bottom 50^{th} percentile. ***, **, and * indicate two tailed significance at 1%, 5%, and 10%, respectively.

VARIABLES	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS	(6) strong	(7) weak
Log(1+CEOdelta)			0.024***			0.023***	0.027***
			(7.839)			(4.570)	(4.755)
Log(1+CEOvega)			0.004	-0.009***		-0.004	0.006
			(1.369)	(-3.043)		(-0.859)	(1.095)
Log(Pay Gap)			-0.001	0.025***	0.016***	0.002	0.001
			(-0.411)	(7.974)	(5.887)	(0.321)	(0.179)
Log(1+CFOdelta)			0.094***			0.060***	0.088***
			(17.711)			(8.067)	(11.317)
Log(1+CFOvega)			-0.083***	-0.006*		-0.045***	-0.073***
			(-15.500)	(-1.764)		(-6.086)	(-9.253)
$\Delta C_{i,t}$	1.093***	1.619***	1.878***	2.429***	2.420***	2.091***	1.440**
	(19.680)	(16.793)	(6.011)	(7.549)	(7.586)	(3.327)	(2.358)
$\Delta E_{i,t}$	0.443***	0.439***	0.411***	0.437***	0.439***	0.390***	0.419***
	(13.664)	(13.510)	(13.163)	(13.443)	(13.518)	(5.945)	(7.453)
$\Delta NA_{i,t}$	0.271***	0.273***	0.216***	0.267***	0.267***	0.295***	0.201***
	(13.032)	(13.329)	(11.139)	(13.084)	(13.081)	(7.191)	(6.737)
$\Delta RD_{i,t}$	1.628***	1.551***	1.186***	1.544***	1.521***	-0.168	0.862
	(4.092)	(3.926)	(3.116)	(3.905)	(3.859)	(-0.226)	(1.201)
$\Delta I_{i,t}$	-2.716***	-2.537***	-2.394***	-2.475***	-2.521***	-1.990**	-2.013**
	(-5.936)	(-5.550)	(-5.475)	(-5.390)	(-5.508)	(-1.997)	(-2.454)
$\Delta D_{i,t}$	1.293***	1.214**	0.310	1.108**	1.065**	1.442*	0.364
	(2.629)	(2.458)	(0.655)	(2.222)	(2.151)	(1.784)	(0.486)
$C_{i,t-1}$	0.387***	0.376***	0.453***	0.381***	0.391***	0.492***	0.299***
	(13.388)	(12.820)	(15.406)	(12.763)	(13.140)	(9.352)	(6.578)
$L_{i,t}$	-0.113***	-0.111***	-0.080***	-0.115***	-0.112***	-0.180***	-0.214***
	(-16.015)	(-15.847)	(-11.990)	(-16.248)	(-15.868)	(-4.758)	(-6.537)
$NF_{i,t}$	-0.164***	-0.173***	-0.154***	-0.167***	-0.161***	-0.426***	-0.202***
	(-4.312)	(-4.609)	(-4.354)	(-4.457)	(-4.311)	(-5.431)	(-3.357)
$\Delta C_{i,t}$*$C_{i,t-1}$		-1.100***	-0.809***	-1.129***	-1.155***	-0.859	-0.656
		(-4.210)	(-3.205)	(-4.255)	(-4.405)	(-1.478)	(-1.458)
$L_{i,t}$*$C_{i,t-1}$		-0.609***	-0.401***	-0.574***	-0.585***	-0.399	-1.340***
		(-5.812)	(-4.014)	(-5.463)	(-5.600)	(-0.760)	(-3.114)
Log(Pay Gap)* $\Delta C_{i,t}$			-0.203***	-0.117***	-0.111***	-0.126	-0.149*
			(-4.399)	(-2.612)	(-2.750)	(-1.309)	(-1.647)
Log(1+CEOdelta) * $\Delta C_{i,t}$			0.056			0.098	0.019

			(1.125)			(1.120)	(0.201)
Log(1+CEOvega) * $\Delta C_{i,t}$			0.068	0.035		-0.119	0.131
			(1.338)	(0.711)		(-1.397)	(1.587)
Log(1+CFOdelta) * $\Delta C_{i,t}$			0.429***			0.080	0.357***
			(5.999)			(0.622)	(3.063)
Log(1+CFOvega) * $\Delta C_{i,t}$			-0.398***	-0.043		-0.019	-0.331***
			(-5.077)	(-0.707)		(-0.142)	(-2.931)
Constant	0.074	0.072	-0.171*	-0.064	-0.039	-0.351***	-0.310***
	(0.735)	(0.723)	(-1.783)	(-0.618)	(-0.381)	(-3.455)	(-4.499)
Observations	20,116	20,116	20,116	20,116	20,116	4,800	5,621
Adjusted R-squared	0.128	0.132	0.184	0.136	0.134	0.153	0.176
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes

5.6 Tournament incentives and marginal value of cash under different leverage level

Although I have found that a lower value of cash is associated with higher internal tournament incentives, I sharpen my tests by checking the relationship between tournament incentives and the marginal value of cash under different levels of leverage ratio. My findings in Table 5.4 support costly contracting theory that tournament incentives decrease the marginal value of cash by maintaining sufficient liquidity, which benefits debtholders at the expense of equityholders. Thus, it is necessary for us to conduct further checks of the impact of tournament incentives on the marginal value of cash by dividing my sample by different degrees of leverage. If the negative relationship between tournament incentives and the marginal value of cash is driven by costly contracting theory, I predict that the negative relationship will be more pronounced for firms with a higher leverage ratio, because the influence of debtholders on firms' liquidity policy increases with the leverage ratio, which leads to better protection of shareholders' right. To examine this issue, I add a triple interaction between the change in cash, tournament incentives and a leverage dummy variable in my regression model. The leverage dummy variable (Highlev) equals one if the firm has an above sample median leverage ratio. In all the above specifications, the coefficient on the interaction term (Log(Pay Gap) *($\Delta C_{i,t}/M_{i,t-1}$)) captures the impact of tournament incentives on the marginal value of cash for the low leveraged firm. Alternatively, the coefficient on the triple interaction term (Log(Pay Gap) *($\Delta C_{i,t}/M_{i,t-1}$)*Highlev) examines the difference in the impact of tournament incentives on the marginal value of cash between high and low leveraged firms. If costly contracting theory holds, I then predict that the absolute value of the coefficient on the interaction term (Log(Pay Gap) *($\Delta C_{i,t}/M_{i,t-1}$)) will be much smaller the absolute value of the triple interaction term (Log(Pay Gap) *($\Delta C_{i,t}/M_{i,t-1}$)*Highlev).

I report the results in Table 5.5. The variable of interests is the triple interaction term (Log(Pay Gap) *($\Delta C_{i,t}/M_{i,t-1}$)*Highlev), and I find that coefficient of the triple interaction term is negative and significant in all regressions. In addition, I find that the absolute value of the coefficient on the triple interaction term is larger than the absolute value of coefficient on the interaction term (Log(Pay Gap) *($\Delta C_{i,t}/M_{i,t-1}$)), indicating that the relationship between tournament incentives and the marginal value of cash is more negative for high leverage firms than for low leveraged firms. For example, in Model 2 of Table 5.5, I find that an additional value of dollar is worth $ 1.219 ($ 1.842) in the firms with a higher (lower) degree of leverage, which further supports the costly contracting theory that tournament incentives can decrease the marginal value of cash more in high levered firms.

Table 5.5 Tournament incentives and marginal value of cash under different leverage levels

The table below presents the regression results of the impacts of firm-level tournament incentives interacted with leverage on the marginal value of cash. The dependent variable in each model is the excess stock return.

VARIABLES	(1) OLS	(2) OLS
$\Delta C_{i,t}$	1.949***	2.149***
	(6.208)	(6.688)
High Lev	-0.008	-0.035***
	(-1.218)	(-5.170)
Log(1+CEOvega)	0.005	
	(1.522)	
Log(1+CEOvega) * $\Delta C_{i,t}$	0.036	
	(0.748)	
Log(Pay Gap)	-0.003	0.017***
	(-0.935)	(6.180)
Log(Pay Gap)* $\Delta C_{i,t}$	-0.041	-0.049
	(-0.897)	(-1.135)
Log(Pay Gap)* $\Delta C_{i,t}$*High Lev	-0.075***	-0.084***
	(-4.357)	(-4.768)
Log(1+CFOvega)	-0.087***	
	(-16.022)	
Log(1+CFOvega) * $\Delta C_{i,t}$	-0.047	
	(-0.780)	
$\Delta C_{i,t}$*$C_{i,t-1}$	-1.229***	-1.269***
	(-4.802)	(-4.797)
$L_{i,t}$*$C_{i,t-1}$	-0.116	-0.136
	(-1.002)	(-1.138)
Constant	-0.169*	-0.035
	(-1.743)	(-0.334)
(Log(Pay Gap)* $\Delta C_{i,t}$) +(Log(Pay Gap)* $\Delta C_{i,t}$*High Lev)	-0.116 (0.007)	
Controls	Yes	Yes
Observations	20,116	20,116
Adjusted R-squared	0.181	0.137
Industry dummy	Yes	Yes
Year dummy	Yes	Yes

5.7 Internally hired CEOs

Cremers and Grinstein (2014) use the ratio of CEOs who come from inside the firm in an industry to capture the importance that firms place on replacing firm-specific talent. Additionally, Coles, Li, and Wang (2013) find that industries for which hiring externally CEOs is more costly indicate a limited talent pool for CEO candidates and thus attenuate external tournament incentives. Boudreau, Lacetera, and Lakhani (2011) find that greater rivalry decreases the incentives of all competitors in a contest to exert effort and make investments, since adding competitors decreases the winning probability of each competitor which risks diluting their incentive to exert efforts or make investments. Senior executives in firms where firm-specific knowledge is highly needed and hiring external CEOs is costly will face less external competition and thus increase both their probability of being promoted and the estimated effects of tournament incentives. Accordingly, I predict that risk-taking activities encouraged by tournament incentives are smaller in firms with a lower ratio of internally promoted CEOs, because senior executives in such firms face greater rivalry not only internally but also externally. In addition, I predict that the negative impact of tournament incentives is moderated in firms with a lower ratio of internally promoted CEOs. I use the outsider and insider new CEOs distribution data reported in Cremers and Grinstein (2014). Specifically, PctinsiderCEO is the ratio of new CEO hires in that industry that were internally promoted between 1993 and 2005.

To examine this issue, I perform a series of tests. I define a lower internal promoted CEO indicator and set it to one for firms in the bottom quartile of the outsider and insider new CEO distribution for all industries (PctinsiderCEO). I create a triple interaction term of the change in cash, tournament incentives, and lower internally promoted CEOs' indicator. If the impact of tournament incentives on managers' risk-taking is smaller in firms with a relatively lower percentage of internally promoted CEOs, I predict that the sign of the coefficient on the triple interaction term is positive. The coefficient on the triple interaction term (Log (Pay Gap) *($\Delta C_{i,t}/M_{i,t-1}$)*LowerinsiderCEO) captures the difference in the effects of tournament incentives on the marginal value of cash between the lower internally promoted CEO ratio and the higher internally promoted CEO firms.

Table 5.6 reports the results. Estimates for the double interaction term (Log(Pay Gap) *($\Delta C_{i,t}/M_{i,t-1}$)) are negative and significant whereas the triple interaction term (Log(Pay Gap) *($\Delta C_{i,t}/M_{i,t-1}$)*LowerinsiderCEO) is positive and significant in column (1) and column (2) of Table 5.6. The joint effect of these interactions indicates that while tournament incentives decrease the value of the additional cash for the average firm, such a decrease is absent for firms with a lower internally promoted CEO ratio. My results indicate that an additional dollar is worth less in firms with a higher internally promoted CEO ratio. These results imply that the effect of tournament incentives on firm risk is smaller where firms have a lower internally promoted CEOs ratio.

Table 5.6 Internally hired CEOs

The table below presents the regression results of the impacts of firm-level tournament incentives interacted with ratio of internal promoted CEOs on the marginal value of cash. The dependent variable in each model is the excess stock return.

VARIABLES	(2) OLS	(4) OLS
$\Delta C_{i,t}$	2.193***	2.431***
	(7.032)	(7.581)
PctinsideCEO	-0.059***	-0.054***
	(-5.096)	(-4.573)
Log(1+CEOvega)	0.005	
	(1.452)	
Log(1+CEOvega) * $\Delta C_{i,t}$	0.040	
	(0.809)	
Log(Pay Gap)	-0.003	0.016***
	(-0.927)	(5.979)
Log(Pay Gap)* $\Delta C_{i,t}$	-0.102**	-0.120***
	(-2.326)	(-2.932)
Log(Pay Gap)* $\Delta C_{i,t}$*PctinsideCEO	0.062***	0.070***
	(2.735)	(2.919)
Log(1+CFOvega)	-0.087***	
	(-15.943)	
Log(1+CFOvega) * $\Delta C_{i,t}$	-0.059	
	(-0.963)	
$L_{i,t}$*$C_{i,t-1}$	-0.490***	-0.563***
	(-4.927)	(-5.407)
$\Delta C_{i,t}$*$C_{i,t-1}$	-1.163***	-1.188***
	(-4.562)	(-4.519)
Constant	-0.177*	-0.043
	(-1.851)	(-0.424)
(Log(Pay Gap)* $\Delta C_{i,t}$)+ (Log(Pay Gap)* $\Delta C_{i,t}$*PctinsideCEO)	-0.040 0.3930	
Controls	Yes	Yes
Observations	20,035	20,035
Adjusted R-squared	0.182	0.137
Industry dummy	Yes	Yes
Year dummy	Yes	Yes

5.8 CFOs' career horizons

In this section, I examine the impacts of CFO age on the negative relationship between tournament incentives and the marginal value of cash. If the CFOs win the tournament, they will experience a permanent increase in compensation. Therefore, the stream of compensation benefits caused by winning the tournament can create strong incentives for CFOs to pursue CEO positions early in their career. I then predict that tournament incentives will decline with a CFO's career horizons. This suggests that I can sharpen my tests by focusing on the tournament incentives for the marginal value of cash by sub-dividing my sample by CFO career horizons. If CFOs' tournament incentives decline with their career horizons, I would expect that the negative relationship between internal tournament incentives and the marginal value of cash would be moderated when CFOs are near retirement age. The reason is that when CFOs are near retirement age, the stream of compensation benefits caused by winning the tournament may be not sufficient to compensate the risks they took and effort they exerted.

To test my prediction about CFOs career concerns, I perform a series of tests. I define a CFOs' career concerns indicator and set it to one for firms whose CFOs' age is older than 60. I create a triple interaction term of the change in cash, tournament incentives, and CFOs' career concerns indicator. This triple interaction term is my variable of interest in column (1) and column (2) of Table 5.7, which captures the difference in the effects of tournament incentives on the marginal value of cash between firms with longer CFO career horizons and shorter CFO career horizons. If the CFOs who are near retirement age and have short career horizons lower their tournament incentives on risk-taking, I expect that the coefficient on the triple interaction term will be positive and significant.

Table 5.7 reports these results. Estimates for the double interaction term (Log(Pay Gap) *($\Delta C_{i,t}/M_{i,t-1}$)) are negative and significant whereas the triple interaction term (Log(Pay Gap)*($\Delta C_{i,t}/M_{i,t-1}$)*CFOcareerhorizon) is positive and significant in column (1) and column (2) of Table 5.7. The joint effect of these interactions indicates that while tournament incentives decrease the value of additional cash for the average firm, such a decrease is absent for firms whose CFOs are near retirement age. My results indicate that an additional dollar is worth less in firms whose CFOs have longer career horizons. These results imply that the effects of tournament incentives on firm risk is smaller in firms whose CFOs are near retirement age.

Table 5.7 CFOs' career horizons

The table below presents the regression results of the impacts of firm-level tournament incentives interacted with CFOs career horizon on the marginal value of cash. The dependent variable in each model is the excess stock return.

VARIABLES	(1) OLS	(2) OLS
$\Delta C_{i,t}$	2.210***	2.480***
	(5.222)	(5.652)
CFO retire	-0.013	0.014
	(-0.932)	(1.029)
Log(1+CEOvega)	-0.000	
	(-0.121)	
Log(1+CEOvega) * $\Delta C_{i,t}$	0.023	
	(0.422)	
Log(Pay Gap)	-0.012***	0.008**
	(-3.046)	(2.245)
Log(Pay Gap)* $\Delta C_{i,t}$	-0.136**	-0.168***
	(-2.480)	(-3.074)
Log(Pay Gap) * $\Delta C_{i,t}$*CFOretire	0.057**	0.054*
	(2.005)	(1.840)
Log(1+CFOvega)	-0.061***	
	(-10.810)	
Log(1+CFOvega) * $\Delta C_{i,t}$	-0.058	
	(-0.818)	
$L_{i,t}$*$C_{i,t-1}$	-0.258**	-0.283**
	(-2.166)	(-2.312)
$\Delta C_{i,t}$*$C_{i,t-1}$	-0.285	-0.275
	(-1.140)	(-1.053)
Constant	-0.265***	-0.147***
	(-6.114)	(-3.159)
(Log(Pay gap)* $\Delta C_{i,t}$)+ (Log(Pay Gap) * $\Delta C_{i,t}$*CFO retire)	-0.079 0.1949	
Controls	Yes	Yes
Observations	9,373	9,373
Adjusted R-squared	0.177	0.132
Industry dummy	Yes	Yes
Year dummy	Yes	Yes

5.9 Conclusion

My paper examines the relationship between the firm-level tournament incentives of the CFO and the level and valuation of corporate cash holdings. The previous literature focused primarily on whether compensation provides managers with incentives to take higher risk. Few studies have examined the promotion-based tournament incentives and managerial risk-taking behaviour. My paper attempts to fill this gap by investigating the relationship between the level and value of corporate cash holdings.

In general, I find a positive association between firm-level tournament incentives and firm cash holdings. I find this result to be robust across the lagged incentives employed. This finding is supportive of the argument that tournament incentives encourage managerial risk-taking behaviour. I also evaluate the impact of tournament incentives on the valuation of corporate cash holdings by using the Faulkender and Wang (2006) approach to measure the marginal value of cash to equityholders. I find a negative association between firm-level tournament incentives and the valuation of corporate cash holdings which is consistent with costly contracting theory. The costly contracting theory argues that debtholders require greater liquidity since they predict greater risk-taking in firms with higher tournament incentives. Furthermore, I find that the negative relationship between firm-level tournament incentives is enhanced in firms with a higher leverage ratio and moderated in firms whose CFOs are near retirement and have a lower internally promoted CEO ratio.

In conclusion, my results add to the growing literature that examines the impact of tournament incentives on managerial risk-taking behaviour. My findings suggest that firm-level tournament incentives can be contrary to equityholder interests in that they lead to intensified conflict between debtholders and equityholders. Nonetheless, I also highlight the role of firms' leverage ratio, CFO career horizon, and ratio of internally promoted CEOs in the negative relationship between firm-level tournament incentives and the valuation of corporate cash holdings.

Chapter 6 Conclusions and Implications for Future Research

6.1 Summary and conclusions

In Chapter 2, I examine the effects of female directors on corporate debt maturity structures. Incorporating female directors on boards has been emphasized by regulators, social activists and the media over the past two decades, and companies have responded to the call. However, investigation into female directors' impact remains limited. Adding to the main stream of research which explores female directors' direct effect on firm performance and firm value, I extend the emerging literature on female directors' monitoring role by examining whether or not the gender composition of boards affects corporate debt maturity structures. Prior literature suggests that female directors have a different kind of deliberation in board discussions and greater monitoring intensity than their male counterparts. Meanwhile literature on debt maturity structure suggests that short-term debt can serve as a governance monitoring device by subjecting managers to greater scrutiny, exposing them to higher liquidity risk, and reducing the cash flow available for overinvestment. Therefore, I hypothesise that boards with more female directors are more likely to use short-term debt as a monitoring device; and the effect is weaker when other corporate governance mechanisms are strong and overinvestment is less likely to happen.

My findings consistently support my hypothesis across different research methods and a variety of robust and additional tests. Specifically, I find that firms with a higher proportion of female directors tend to issue more short-term debt than firms with all-male directors. This finding is robust after considering unobservable heterogeneity, using the PSM and instrumental variable approaches. Further analysis shows that my full sample results are driven by firms with weak governance quality and higher governance needs, suggesting that female directors view short-term debt as a corporate governance mechanism in firms with weak corporate governance as well as higher governance needs. In addition, I find that the positive relationship between the fraction of female directors and short-term debt disappears when firms have financial constraints and during the financial crisis period (2007–2009), since the overinvestment associated with the free cash flow agency problem decreases due to the decline in internal cash flow and financial constraints during the crisis. Finally, a more direct test on the association between female independent directors and firm investment inefficiency shows that female directors are negatively associated with total investment inefficiency and overinvestment but not associated with underinvestment, suggesting that my underlying assumption that female directors utilize short-term debt to minimize the likelihood of overinvestment is more likely to be true. Overall, my findings contribute to three streams of literature and have practical implications. First, I provide evidence that female directors are positively related to the usage of short-term debt, adding to existing research that finds female directors play a significant role in a series of important corporate decisions. Second, I contribute to the literature that explores various determinants of corporate debt maturity structure, and provide evidence that female directors on the board is one of the factors that shapes corporate debt maturity policies. Third, I highlight that female directors undertake more monitoring than their male counterparts by using short-term debt as a monitoring device, especially when firms have weak corporate governance quality and higher corporate governance needs. This contributes to the literature that links gender diversity on boards to monitoring intensity. From the perspective of governance practice, my findings suggest incorporating female directors on a board could be a substitute governance mechanism that would, without them, be much needed.

In chapter 3, I study the association between both the age of compensation committee members and the age dissimilarity between the CEO and compensation committee members and CEO compensation, using a dataset of FTSE 350 firms with 3,420 firm–year observations during 2002–2013. My study focuses on the age effects and age dissimilarity effects, and how they affect compensation committees' monitoring intensity proxied by CEO total compensation level, CEO cash compensation, excess total compensation, and excess cash compensation. I posit that older compensation committee members exhibit a higher-level ethical standard and are more committed to their responsibility, which is scrutinizing the level of CEOs' compensation. In addition, I hypothesize that the greater age dissimilarity between the CEO and compensation committee members induces cognitive conflicts between the CEO and compensation committee members, which results in more intensive monitoring from compensation committee members. To test my hypotheses, I perform regressions of CEO compensation, CEO cash compensation, excess CEO compensation, and excess cash compensation on the age of compensation committee members and the age dissimilarity between the CEO and compensation committee members. I show that older compensation committee members and a larger age dissimilarity between the CEO and compensation committee members curb the level of CEO compensation, thus reducing CEO total compensation and cash compensation. My findings are robust to a variety of robustness tests including firm-fixed effect, PSM approach, and sensitivity tests by controlling for CEO power.

My findings make a number of important contributions. First, after controlling for the economic and corporate governance variables of the firm, I find statistically reliable evidence that older compensation committees and a larger age dissimilarity between the CEO and compensation committee members are associated with a lower level of total CEO pay, total CEO cash pay, excess CEO pay, and excess CEO cash pay. These findings are consistent with the literature highlighting that individuals' ethical standards increase with age, and age dissimilarity leads to cognitive independence and fosters cognitive conflicts between group members. Second, my study suggests inference to policymakers, who generally focus on the independence of audit committees: they could consider the needs of older compensation committee members and a larger age dissimilarity between the CEO and compensation committee members.

In chapter 4, I examines the effect of CEOs' human capital on corporate investment policies. In particular, I try to disentangle the impacts of CEOs with general human capital and those with firm-specific human capital on firms' investment decisions. The previous literature documents that agency problems and information asymmetries are the two principle sources of investment inefficiency. In this paper, using a sample of 15,712 firm–year observations from 1993 to 2006, I examine the relationship between the CEOs with general managerial skills and investment efficiency, and whether such a relationship is stronger for firms with more severe agency conflicts (poorly governed, higher level of information asymmetry, less financially constrained). I find that firms featuring generalist CEOs can deteriorate investment efficiency by expropriate agency problems. In particular, I document that firms featuring CEOs with general managerial skills are only associated with overinvestment, which further support the argument that generalist CEOs are more likely to take more risks compared with their specialist CEO counterparts. This positive association is stronger among firms with poor corporate governance quality, firms with high information asymmetries, and firms that are less financially constrained. My findings are robust when using alternative measure of generalist CEOs, alternative measures of investment efficiency, and several additional tests to address any potential endogeneity concerns.

My study contributes to understanding the role of CEOs with general managerial skills in corporate investment policies. To the best my knowledge, this is the first study to document that firms featuring general managerial skills are positively associated with investment inefficiency and that this association occurs through the role of generalist CEOs in deteriorating agency problems. These results have empirical implications for CEO selection decisions. First, generalist CEOs' tendency to take higher risks should be taken into consideration when firms are hiring a new CEO. Unlike a specialist CEO, a generalist CEO whose incentives are misaligned with the incentives of shareholders may make sub-optimal investment decisions if she believes that she can maximize her personal welfare through investing in value destroying projects.

In chapter 5, I examine the relationship between the promotion-based tournament incentives of the CFO and the level and valuation of firm cash holdings. The previous literature focused primarily on whether compensation provides managers with incentives to take higher risk. Few studies have examined the promotion-based tournament incentives and managerial risk-taking behaviour. My paper attempts to fill this gap by investigating the relationship between the level and value of corporate cash holdings.

In general, I find a positive association between firm-level tournament incentives and firm cash holdings. I find this result to be robust across the lagged incentives employed. This findings is supportive of the argument that tournament incentives encourage managerial risk-taking behaviour. I also evaluate the impact of tournament incentives on the valuation of corporate cash holdings by using the Faulkender and Wang (2006) approach to measure the marginal value of cash to equityholders. I find a negative association between firm-level tournament incentives and the valuation of corporate cash holdings which is consistent with costly contracting theory. The costly contracting theory argues that debtholders require greater liquidity since they predict greater risk-taking in firms with higher tournament incentives. Furthermore, I find that the negative relationship between firm-level tournament incentives is enhanced in firms with a higher leverage ratio and moderated in firms whose CFOs are near retirement and have a lower internally promoted CEO ratio.

In conclusion, my results add to the growing literature that examines the impact of tournament incentives on managerial risk-taking behaviour. My findings suggest that firm-level tournament incentives can be contrary to equityholder interests in that they lead to intensified conflict between debtholders and equityholders. Nonetheless, I also highlight the role of firms' leverage ratio, CFO career horizon, and ratio of internally promoted CEOs in the negative relationship between firm-level tournament incentives and the valuation of corporate cash holdings.

6.2 Implications for Future research

This thesis explores how corporate governance, characteristics of board members, CEOs' human capital, and tournament incentives of senior executives impact corporate policies. The thesis provides valuable insights in the area of corporate governance. In addition, it identifies many interesting questions for future research.

In chapter 2, I explore the effects of gender diversity on debt maturity structure of a firm and find that the firms with a higher ratio of female directors tend to have a larger proportion of short-term maturity debt. One possible extension of this analysis is to further discuss the role debtholders play on a firm's debt maturity structures. In addition, it would be interesting to explore the role of female directors on the loan covenants as well.

In chapter 3, I study the impact of biographic characteristics of the compensation committee members on the CEO compensation and excess compensation. I document that monitoring intensity increases with age, and therefore, the (excess) CEO pay levels are lower in firms whose compensation committee is composed of older directors. Other studies find similar results in a non-board related context. What's not clear, however, is whether this positive association is expected to be linear across the entire age distribution or whether effects are more pronounced at certain points on the age spectrum.

In chapter 4, when explaining the role the generalist CEOs play on firms' investment efficiency, I find that firms featuring generalist CEOs can deteriorate investment efficiency by expropriating agency problems. In particular, I document that firms featuring CEOs with general managerial skills are only associated with overinvestment, which further support the argument that generalist CEOs are more likely to take on more risk compared with their specialist CEO counterparts. One avenue for future research could be to test the explanations, for instance, whether the experience which specialist CEOs accumulate in specific firms affect a firm's investment efficiency.

In chapter 5, I explore the role firm-level tournament incentives play on the level and value of a firm's cash holdings, and find a positive association between firm-level tournament incentives and firm cash holdings. These results are robust across the lagged incentives employed. These findings support the argument that tournament incentives encourage managerial risk-taking behaviour. I also evaluate the impact of tournament incentives on the valuation of corporate cash holdings by using the Faulkender and Wang (2006) approach to measure the marginal value of cash to equityholders. I find a negative association between firm-level tournament incentives and the valuation of corporate cash holdings which is consistent with costly contracting theory. Although several robust tests applied, a further extension to study the channel through which frim-level tournament incentives affect the level and value of firms' cash holding is worth doing. In addition, it is helpful to understand the role firm-level tournament incentives play on the level and value of firms' cash holdings under different conditions, for instance, financial constraints and riskiness.

References

Abel, A.B., 1983. Optimal investment under uncertainty. *The American Economic Review*, *73*(1), pp. 228–233.

Adams, R.B. and Ferreira, D., 2009. Women in the boardroom and their impact on governance and performance. *Journal of Financial Economics*, *94*(2), pp.291-309.

Adams, R.B., Gray, S. and Nowland, J., 2011. Does gender matter in the boardroom? Evidence from the market reaction to mandatory new director announcements. SSRN Working Paper (2011) (available at http://ssrn.com/abstract=1953152)

Ahern, K.R. and Dittmar, A.K., 2012. The changing of the boards: The impact on firm valuation of mandated female board representation. *The Quarterly Journal of Economics*, *127*(1), pp.137-197.

Altman, E.I., 1977. The Z-Score bankruptcy model: past, present, and future. *Financial Crises, New York, 1977*, pp.89-129.

Anderson, Ronald C., and John M. Bizjak. "An empirical examination of the role of the CEO and the compensation committee in structuring executive pay." *Journal of Banking & Finance* 27.7 (2003): 1323–1348.

Arlow, Peter. "Personal characteristics in college students' evaluations of business ethics and corporate social responsibility." *Journal of Business Ethics* 10.1 (1991): 63–69.

Arye Lucian, and Jesse M. Fried. "Executive compensation as an agency problem." *The Journal of Economic Perspectives* 17.3 (2003): 71–92.

Barclay, M.J. and Smith, C.W., 1995. The maturity structure of corporate debt. *The Journal of Finance*, *50*(2), pp.609-631.

Barclay, M.J., Marx, L.M. and Smith, C.W., 2003. The joint determination of leverage and maturity. *Journal of Corporate Finance*, *9*(2), pp.149-167.

Barnea, A., Haugen, R.A. and Senbet, L.W., 1980. A rationale for debt maturity structure and call provisions in the agency theoretic framework. *The Journal of Finance*, *35*(5), pp.1223-1234.

Barnett, John H., and Marvin J. Karson. "Managers, values, and executive decisions: An exploration of the role of gender, career stage, organizational level, function, and the importance of ethics, relationships and results in managerial decision-making." *journal of Business Ethics* 8.10 (1989): 747-771.

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, no. 5 (2009): 1985-2021.

Bebchuk, L., Cohen, A. and Ferrell, A., 2009. What matters in corporate governance? *Review of Financial studies*, *22*(2), pp.783-827.

Biddle, G.C., Hilary, G., and Verdi, R.S., 2009. How does financial reporting quality relate to investment efficiency? *Journal of Accounting and Economics*, *48*(2–3), pp. 112–131.

Billett, M., King, T., Mauer, D., 2007. Growth opportunities and the choice of leverage, debt maturity, and covenants. *Journal of Finance* 62, 697–730.

Blanchard, O.J., Lopez-de-Silanes, F., and Shleifer, A., 1994. What do firms do with cash windfalls? *Journal of Financial Economics*, *36*(3), pp. 337–360.

Brady, F. Neil, and Gloria E. Wheeler. "An empirical study of ethical predispositions." *Journal of Business Ethics* 15.9 (1996): 927–940.

Brewer, Marilynn B. "In-group bias in the minimal intergroup situation: A cognitive–motivational analysis." *Psychological Bulletin* 86.2 (1979): 307–324.

Brick, I.E. and Ravid, S.A., 1985. On the relevance of debt maturity structure. *Journal of Finance* 40, 1423-1437.

Brick, I.E. and Ravid, S.A., 1991. Interest rate uncertainty and the optimal debt maturity structure. *Journal of Financial and Quantitative Analysis*, *26*(01), pp.63-81.

Brockman, P., Martin, X. and Unlu, E., 2010. Executive compensation and the maturity structure of corporate debt. *The Journal of Finance, 65*(3), pp.1123-1161.

Borkowski, Susan B. and Yusuf J. Ugras. Business students and ethics: A meta-analysis. *Journal of Business Ethics* 17.11 (1998): 1117–1127.

Boudreau, Kevin J., Nicola Lacetera, and Karim R. Lakhani. "Incentives and problem uncertainty in innovation contests: An empirical analysis." *Management science* 57, no. 5 (2011): 843-863.

Bugeja, Martin, Zoltan Matolcsy, and Helen Spiropoulos. "The Association Between Gender-Diverse Compensation Committees and CEO Compensation." *Journal of Business Ethics* (May 2015): 1–16.

Campbell, K., & Mínguez-Vera, A. (2008). Gender diversity in the boardroom and firm financial performance. *Journal of business ethics*, *83*(3), 435-451.

Campello, M., Graham, J.R. and Harvey, C.R., 2010. The real effects of financial constraints: Evidence from a financial crisis. *Journal of Financial Economics, 97*(3), pp.470-487.

Carroll, Archie B., and Ann K. Buchholtz. *Business and society: Ethics, sustainability, and stakeholder management*. Nelson Education, 2014.

Carter, D.A., Simkins, B.J. and Simpson, W.G., 2003. Corporate governance, board diversity, and firm value. *Financial Review*, *38*(1), pp.33-53.

Carter, M., Franco, F., Gine, M., 2017. Executive gender pay gaps: the roles of female risk aversion and board representation. *Contemporary Accounting Research 34*(2) pp. 1232–1264.

Chalmers, Keryn, Ping-Sheng Koh, and Geof Stapledon. "The determinants of CEO compensation: Rent extraction or labour demand?." *The British Accounting Review* 38.3 (2006): 259–275.

Chen, F., Hope, O.K., Li, Q., and Wang, X., 2014. Financial reporting quality and investment efficiency of private firms in emerging markets. *The Accounting Review*, *86*(4), pp. 1255–1288.

Chen, J., Leung, W.S. and Goergen, M., 2017. The impact of board gender composition on dividend payouts. *Journal of Corporate Finance*, 43, pp. 86-105.

Childs, P.D., Mauer, D.C., and Ott, S.H., 2005. Interactions of corporate financing and investment decisions: The effects of agency conflicts. *Journal of Financial Economics,* 76, pp.667–690.

Clarke, C.J., 2005. The XX factor in the boardroom: Why women make better directors. *Directors Monthly*, *24*, pp.8-10.

Coase, R. H. (1937). The nature of the firm. *economica*, 4(16), 386-405.

Core, John E., Robert W. Holthausen, and David F. Larcker. "Corporate governance, chief executive officer compensation, and firm performance." *Journal of Financial Economics* 51.3 (1999): 371–406.

Coles, Jeffrey L., Zhichuan Frank Li, and Yan Albert Wang. "Industry tournament incentives." (2013).

Coles, Jeffrey L., Naveen D. Daniel, and Lalitha Naveen. "Managerial incentives and risk-taking." *Journal of financial Economics* 79, no. 2 (2006): 431-468.

Cragg, J.G. and Donald, S.G., 1993. Testing identifiability and specification in instrumental variable models. *Econometric Theory*, *9*(02), pp.222-240.

Cremers, KJ Martijn, and Yaniv Grinstein. "Does the market for CEO talent explain controversial CEO pay practices?." *Review of Finance* 18, no. 3 (2014): 921-960.

Croci, Ettore, Halit Gonenc, and Neslihan Ozkan. "CEO compensation, family control, and institutional investors in Continental Europe." *Journal of Banking & Finance* 36.12 (2012): 3318–3335.

Custódio, C., Ferreira, M.A. and Laureano, L., 2013. Why are US firms using more short-term debt? *Journal of Financial Economics*, *108*(1), pp.182-212.

Custódio, C., Ferreira, M.A., and Matos, P., 2013. Generalists versus specialists: Lifetime work experience and chief executive officer pay. *Journal of Financial Economics*, *108*(2), pp. 471–492.

Custódio, C., Ferreira, M.A., and Matos, P., 2017. Do general managerial skills spur innovation?. *Management Science*, online.

Cyert, Richard M., Sok-Hyon Kang, and Praveen Kumar. "Corporate governance, takeovers, and top-management compensation: Theory and evidence." *Management Science* 48.4 (2002): 453–469.

Datta, S., Iskandar-Datta, M.A.I. and Raman, K., 2005. Managerial stock ownership and the maturity structure of corporate debt. *The Journal of Finance*, *60*(5), pp.2333-2350.

Datta, S., Iskandar-Datta, M., & Raman, K., 2000. Debt structure adjustments and long-run stock price performance. *Journal of Financial Intermediation*, *9*(4), 427-453.

Dang, V.A. and Phan, H.V., 2016. CEO inside debt and corporate debt maturity structure. *Journal of Banking & Finance*, *70*, pp.38-54.

Dang V.A., Lee E., Liu Y., Zeng C., 2017. Corporate debt maturity and stock price crash risk. European Financial Management, pp.1–34. https://doi.org/10.1111/eufm.12134

Dehejia, Rajeev H., and Sadek Wahba. "Propensity score-matching methods for nonexperimental causal studies." *Review of Economics and statistic s*84.1 (2002): 151–161.

Demerjian, Peter R., Baruch Lev, Melissa F. Lewis, and Sarah E. McVay. "Managerial ability and earnings quality." *The Accounting Review* 88, no. 2 (2012): 463-498.

Denis, David J., and Valeriy Sibilkov. "Financial constraints, investment, and the value of cash holdings." *Review of financial studies* (2009): hhp031.

Deshpande, Satish P. "Managers' perception of proper ethical conduct: The effect of sex, age, and level of education." *Journal of Business Ethics* 16.1 (1997): 79–85.

Dittmar, Amy, and Jan Mahrt-Smith. "Corporate governance and the value of cash holdings." *Journal of financial economics* 83, no. 3 (2007): 599-634.

Diamond, D.W., 1991a. Debt maturity structure and liquidity risk. *The Quarterly Journal of Economics*, 106(3), pp.709-737.

Diamond, D.W., 1991b. Monitoring and reputation: The choice between bank loans and directly placed debt. *Journal of Political Economy*, *99*(4), pp.689-721.

Duchin, R., Ozbas, O. and Sensoy, B.A., 2010. Costly external finance, corporate investment, and the subprime mortgage credit crisis. *Journal of Financial Economics*, *97*(3), pp.418-435.

Eisfeldt, A.L. and Papanikolaou, D., 2013. Organization capital and the cross-section of expected returns. *The Journal of Finance*, *68*(4), pp. 1365–1406.

Ertimur, Yonca, Fabrizio Ferri, and Volkan Muslu. "Shareholder activism and CEO pay." *Review of Financial Studies* 24:2 (2010): 535–592 hhq113.

Faccio, M., Marchica, M.T. and Mura, R., CEO gender, corporate risk-taking, and the efficiency of capital allocation. *Journal of Corporate Finance*, 2016, vol. 39, issue C, 193-209.

Fama, Eugene F., and Michael C. Jensen. "Separation of ownership and control." *The Journal of Law & Economics* 26.2 (1983): 301–325.

Farrell, K.A. and Hersch, P.L., 2005. Additions to corporate boards: the effect of gender. *Journal of Corporate Finance*, *11*(1-2), pp.85-106.

Faulkender, Michael, and Rong Wang. "Corporate financial policy and the value of cash." *The Journal of Finance* 61, no. 4 (2006): 1957-1990.

Fazzari, S.M., Hubbard, R.G., & Petersen, B.C., 1988. Financing constraints and corporate investment. *Brookings Papers on Economic Activity*, 1, 141–195.

Fracassi, Cesare, and Geoffrey Tate. "External networking and internal firm governance." *The Journal of Finance* 67.1 (2012): 153–194.

Fich, Eliezer M., and Anil Shivdasani. "Are busy boards effective monitors?." *The Journal of Finance* 61.2 (2006): 689–724.

Fich, Eliezer M., Jarrad Harford, and Adam S. Yore. "The effect of takeover protection on the value of cash: Evidence from a natural experiment." (2016).

Flannery, M.J., 1986. Asymmetric information and risky debt maturity choice. *The Journal of Finance*, *41*(1), pp.19-37.

Fracassi, C. and Tate, G., 2012. External networking and internal firm governance. *The Journal of Finance*, *67*(1), pp.153-194.

Goel, Anand M., and Anjan V. Thakor. "Overconfidence, CEO selection, and corporate governance." *The Journal of Finance* 63, no. 6 (2008): 2737-2784.

Gompers, P., Ishii, J., and Metrick, A., 2003. Corporate governance and equity prices. *The Quarterly Journal of Economics*, *118*(1), pp. 107–156.

Guedes, J. and Opler, T., 1996. The determinants of the maturity of corporate debt issues. *The Journal of Finance*, *51*(5), pp.1809-1833.

Gul, F.A., Srinidhi, B. and Ng, A.C., 2011. Does board gender diversity improve the informativeness of stock prices? *Journal of Accounting and Economics*, *51*(3), pp.314-338.

Haß, Lars Helge, Maximilian A. Müller, and Skrålan Vergauwe. "Tournament incentives and corporate fraud." *Journal of Corporate Finance* 34 (2015): 251-267.

Harford, J., Klasa, S. and Maxwell, W.F., 2014. Refinancing risk and cash holdings. *The Journal of Finance*, *69*(3), pp.975-1012.

Harford, Jarrad, Sattar A. Mansi, and William F. Maxwell. "Corporate governance and firm cash holdings in the US." In *Corporate Governance*, pp. 107-138. Springer Berlin Heidelberg, 2012.

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

Hart, O. and Moore, J., 1994. *Debt and seniority: An analysis of the role of hard claims in constraining management* (No. w4886). National Bureau of Economic Research.

Hayashi, F., 1982. Tobin's marginal q and average q: A neoclassical interpretation. *Econometrica: Journal of the Econometric Society*, *50*(1), pp. 213–224.

Hess, T.M., W.L. Osowski, and C.M. LeClerc. “Age and experiences influences on the complexity of social inferences.” Psychology and Aging 20.3 (2005): 447–459.

Hillman, A., Cannella, A.A. and Harris, I. (2002). ‘Women and racial minorities in the boardroom: how do they differ? *Journal of Management*, 28, 747–63.

Huang, J. and Kisgen, D.J., 2013. Gender and corporate finance: Are male executives overconfident relative to female executives? *Journal of Financial Economics*, *108*(3), pp.822-839.

Huang, R., Tan, K.J.K. and Faff, R.W., 2016. CEO overconfidence and corporate debt maturity. *Journal of Corporate Finance*, *36*, pp.93-110.

Huse, M. and Grethe Solberg, A., 2006. Gender-related boardroom dynamics: How Scandinavian women make and can make contributions on corporate boards. *Women in Management Review*, *21*(2), pp.113-130.

Hwang, B.H. and Kim, S., 2009. It pays to have friends. *Journal of Financial Economics*, *93*(1), pp.138-158.ancona

Hwang, B.H. and Kim, S., 2012. Social Ties and Earnings Management. Available at SSRN: https://ssrn.com/abstract=1215962

Jensen, M.C. and Meckling, W.H., 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, *3*(4), pp. 305–360.

Jensen, Michael C. "The modern industrial revolution, exit, and the failure of internal control systems." *The Journal of Finance* 48.3 (1993): 831–880.

Jensen, M.C., 1986. Agency costs of free cash flow, corporate finance, and takeovers. *The American Economic Review*, *76*(2), pp.323-329.

Jia, Ning, Xuan Tian, and Weining Zhang. "The Real Effects of Tournament Incentives: The Case of Firm Innovation." (2016).

Jiang, John Xuefeng, Kathy R. Petroni, and Isabel Yanyan Wang. "CFOs and CEOs: Who have the most influence on earnings management?." *Journal of Financial Economics* 96, no. 3 (2010): 513-526.

Johnson, S.A., 2003. Debt maturity and the effects of growth opportunities and liquidity risk on leverage. *Review of Financial Studies*, *16*(1), pp.209-236.

Kale, Jayant R., Ebru Reis, and Anand Venkateswaran. "Rank-order tournaments and incentive alignment: The effect on firm performance." *The Journal of Finance* 64, no. 3 (2009): 1479-1512.

Kini, Omesh, and Ryan Williams. "Tournament incentives, firm risk, and corporate policies." *Journal of Financial Economics* 103, no. 2 (2012): 350-376.

Kim, Jeong-Bon, Yinghua Li, and Liandong Zhang. "CFOs versus CEOs: Equity incentives and crashes." *Journal of Financial Economics* 101, no. 3 (2011): 713-730.

Kubick, Thomas R., and Adi NS Masli. "Firm-level tournament incentives and corporate tax aggressiveness." *Journal of Accounting and Public Policy* 35, no. 1 (2016): 66-83.

Lang, M.H., Lins, K.V., and Miller, D.P., 2004. Concentrated control, analyst following, and valuation: Do analysts matter most when investors are protected least? *Journal of Accounting Research*, *42*(3), pp. 589–623.

Lazear, Edward P., and Sherwin Rosen. "Rank-order tournaments as optimum labor contracts." *Journal of political Economy* 89, no. 5 (1981): 841-864.

Lee, Jongsub, Kwang J. Lee, and Nandu J. Nagarajan. "Birds of a feather: Value implications of political alignment between top management and directors." *Journal of Financial Economics* 112.2 (2014): 232–250.

Levi, M., Li, K. and Zhang, F., 2014. Director gender and mergers and acquisitions. *Journal of Corporate Finance*, *28*, pp.185-200.

Liu, Yixin, and David C. Mauer. "Corporate cash holdings and CEO compensation incentives." *Journal of Financial Economics* 102, no. 1 (2011): 183-198.

Liu, Yixin, David C. Mauer, and Yilei Zhang. "Firm cash holdings and CEO inside debt." *Journal of Banking & Finance* 42 (2014): 83-100.

Main, Brian GM, Charles A. O'Reilly III, and James Wade. "Top executive pay: Tournament or teamwork?." *Journal of Labor Economics* 11, no. 4 (1993): 606-628.

May, D.O., 1995. Do managerial motives influence firm risk reduction strategies? *The Journal of Finance*, *50*(4), pp.1291-1308.

McPherson, Miller, Lynn Smith-Lovin, and James M. Cook. "Birds of a feather: Homophily in social networks." *Annual Review of Sociology* (2001): 415–444.

McInerney-Lacombe, N., Bilimoria, D. and Salipante, P.F., 2008. Championing the discussion of tough issues: How women corporate directors contribute to board deliberations. *Women on Corporate Boards of Directors: International Research and Practice*, pp.123-139.

Miller, T. and del Carmen Triana, M., 2009. Demographic diversity in the boardroom: Mediators of the board diversity–firm performance relationship. *Journal of Management Studies*, *46*(5), pp.755-786.

Mishra, D.R., 2014. The dark side of CEO ability: CEO general managerial skills and cost of equity capital. *Journal of Corporate Finance*, *29*, pp. 390–409.

Modigliani, F. and Miller, M.H., 1958. The cost of capital, corporation finance and the theory of investment. *The American Economic Review*, *48*(3), pp. 261–297.

Mudrack, Peter E. "Age-related differences in Machiavellianism in an adult sample." *Psychological Reports* 64.3 suppl (1989): 1047–1050.

Myers, S.C., 1977. Determinants of corporate borrowing. *Journal of Financial Economics*, *5*(2), pp.147-175.

Myers, S.C. and Majluf, N.S., 1984. Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, *13*(2), pp. 187–221.

Newman, Harry A., and Haim A. Mozes. "Does the composition of the compensation committee influence CEO compensation practices?." *Financial Management* 28:3 (1999): 41–53.

Nielsen, S. and Huse, M., 2010. The contribution of women on boards of directors: Going beyond the surface. *Corporate Governance: An International Review*, *18*(2), pp.136-148.Post, C. and Byron, K., 2015. Women on boards and firm financial performance: A meta-analysis. *Academy of Management Journal*, *58*(5), pp.1546-1571.

Opler, Tim, Lee Pinkowitz, René Stulz, and Rohan Williamson. "The determinants and implications of corporate cash holdings." Journal of financial economics 52, no. 1 (1999): 3-46.

Ozkan, Neslihan. "CEO compensation and firm performance: An empirical investigation of UK panel data." *European Financial Management* 17.2 (2011): 260–285.

Peterson, Dane K., Angela Rhoads, and Bobby C. Vaught. "Belief in universal ethics: gender differences, influence of referent others, and ethical beliefs of business professionals." Business & Professional Ethics Journal 20.2 (2001): 47-62.

Pfeffer, Jeffrey. "Organizational demography: Implications for management."*California Management Review* 28.1 (1985): 67–81.

Rajan, R.G., 1992. Insiders and outsiders: The choice between informed and arm's-length debt. *The Journal of Finance*, *47*(4), pp.1367-1400.

Rajan, R. and Winton, A., 1995. Covenants and collateral as incentives to monitor. *The Journal of Finance*, *50*(4), pp.1113-1146.

Ray, D.M., 2005. Corporate boards and corporate democracy. *Journal of Corporate Citizenship*, 20, pp. 93-105.

Rhodes, Susan R. "Age-related differences in work attitudes and behavior: A review and conceptual analysis." *Psychological Bulletin* 93.2 (1983): 328–367.

Richardson, S., 2006. Over-investment of free cash flow. *Review of Accounting Studies* 11, pp.159-189.

Rosen, Sherwin. "Authority, control, and the distribution of earnings." *The Bell Journal of Economics* 13:2 (1982): 311–323.

Rosenbaum, Paul R., and Donald B. Rubin. "The central role of the propensity score in observational studies for causal effects." *Biometrika* 70.1 (1983): 41–55.

Ruegger, Durwood, and Ernest W. King. "A study of the effect of age and gender upon student business ethics." *Journal of Business Ethics* 11.3 (1992): 179–186.

Serfling, Matthew A. "CEO age and the riskiness of corporate policies." *Journal of Corporate Finance* 25 (2014): 251–273.

Schmidt, B., 2015. Costs and benefits of friendly boards during mergers and acquisitions. *Journal of Financial Economics*, *117*(2), pp.424-447.

Smith, C.W. and Warner, J.B., 1979. On financial contracting: An analysis of bond covenants. *Journal of Financial Economics*, *7*(2), pp.117-161.

Stein, J.C., 2003. Agency, information and corporate investment. In *Handbook of the Economics of Finance*, Vol. 1, pp. 111–165. Elsevier.

Stephenson, C., 2004. Leveraging diversity to maximum advantage: The business case for appointing more women to boards. *Ivey Business Journal*, *69*(1), pp.1-5.

Stock, J.H. and Yogo, M., 2005. Testing for weak instruments in linear IV regression. *Identification and Inference for Econometric Models: Essays in Honour of Thomas J. Rothenberg*, Cambridge University Press, pp. 80–108.

Stoughton, N.M., Wong, K.P., and Yi, L., 2017. Investment efficiency and product market competition. *Journal of Financial and Quantitative Analysis*, *52*(6), pp. 2611–2642.

Stulz, R., 2001. Does financial structure matter for economic growth? A corporate finance perspective. *Financial Structure and Economic Growth: A Cross-Country Comparison of Banks, Markets, and Development*, pp.143-188.

Sugarman, D.B. and Straus, M.A., 1988. Indicators of gender equality for American states and regions. *Social Indicators Research*, *20*(3), pp.229-270.

Sun, Jerry, and Steven Cahan. "The effect of compensation committee quality on the association between CEO cash compensation and accounting performance." *Corporate Governance: An International Review* 17.2 (2009): 193–207.

Sun, Jerry, Steven F. Cahan, and David Emanuel. "Compensation committee governance quality, chief executive officer stock option grants, and future firm performance." *Journal of Banking & Finance* 33.8 (2009): 1507–1519.

Taylor, Ronald N. "Age and experience as determinants of managerial information processing and decision making performance." *Academy of Management Journal* 18.1 (1975): 74–81.

Terpstra, David E., Elizabeth J. Rozell, and Robert K. Robinson. "The influence of personality and demographic variables on ethical decisions related to insider trading." *The Journal of Psychology* 127.4 (1993): 375–389.

Tsui, A.S., Egan, T.D. and O'Reilly III, C.A., 1992. Being different: Relational demography and organizational attachment. *Administrative Science Quarterly*, pp.549-579.

Tuggle, Christopher S., David G. Sirmon, and Leonard Bierman. "From seats at the table to voices in the discussion: Exploring the effects of proportional representation and prestige on minority directors' participation in board meeting discussions." *Conference on Corporate Governance, Missouri University, Columbia*. 2011.

Turner, John C., Rupert J. Brown, and Henri Tajfel. "Social comparison and group interest in ingroup favouritism." *European Journal of Social Psychology* 9.2 (1979): 187–204.

Turner, J.C., 1982. Towards a cognitive redefinition of the social group. *Social Identity and Intergroup Relations*, pp.15-40.

Twenge, Jean, and Stacy Campbell. "Generational differences in psychological traits and their impact on the workplace." *IEEE Engineering Management Review* 2.39 (2011): 72–84.

Westphal, J.D. and Zajac, E.J., 1995. Who shall govern? CEO/board power, demographic similarity, and new director selection. *Administrative Science Quarterly*, pp.60-8

Yermack, David. "Higher market valuation of companies with a small board of directors." *Journal of Financial Economics* 40.2 (1996): 185–211.

Yoshikawa, H., 1980. On the "q" theory of investment. *The American Economic Review*, *70*(4), pp. 739–743