The University Of Sheffield.

Three essays on board of directors in China

By:

Mao Zhang

A thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy

The University of Sheffield
Faculty of Social Sciences
Management School

December 2017

Abstract

This thesis provides a new insight into the role of board of directors in China. It consists of three main studies. The first examines the effects of board diversity on bank performance captured by profitability and risk. Using a sample of 97 Chinese banks over a period from 2009 to 2013, the results show that board age diversity is negatively associated with bank profitability. To further investigate why age-diverse boards influence bank performance, board age diversity is decomposed into diversity of directors' personal values, utilizing the World Values Survey. The findings suggest that the heterogeneity among directors' views on risk, prudence, and wealth is more likely to spark intragroup conflicts in the decision-making process. This prevents the board from functioning effectively and ultimately weakens bank profitability.

The second study investigates the impact of tournament incentives on non-CEO executives by using data on Chinese firms from 2005 to 2015. Through the analysis of this data, a large pay gap between CEOs and non-CEO executives is found to increase firm performance. This link is even stronger when non-CEO executives are from the same age cohort. The peer pressure among the similar-aged non-CEO executives enhances the tournament competition. However, the tournament effect weakens when non-CEO executives belong to three or more age cohorts. The age heterogeneity of non-CEO executives leads to reduced incentives for younger non-CEO executives and discourages the tournament competition.

The third study explores the impact of board characteristics on excessive managerial risk-taking in state firms. Using a sample of Chinese firms from 2003 to 2015, the finding shows that state-owned companies have a lower cost of debt than private peers. The lower borrowing cost as well as the implicit government guarantees in state firms can also induce excessive risk-taking. On average, there is greater evidence of excess leverage and less cash holdings in state-owned companies. Furthermore, the results also show that

independent directors in state firms could encourage risk-taking by increasing the excess leverage but lowering the excess cost of debt, while board size is positively related to excess cost of debt, excess leverage and excess cash holdings.

Acknowledgement

I would like to express my sincere thanks to my PhD supervisors, the great scholars, Professor Oleksandr Talavera, Dr Shuxing Yin and Dr Junhong Yang, for their expert guidance, supervision, patience and encouragement throughout my PhD study.

In addition, I appreciate the support from my friends accompanied me during my PhD journey. I thank you all for making my PhD study so memorable.

Lastly, my greatest thanks go to my mother, my father and my brother for their unconditional love and support throughout my life. I would like to dedicate this thesis to you.

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Chapter 1 Introduction

1.1 Background

Corporate governance has attracted much attention from academics and practitioners in the past few decades. In modern corporations, the separation of ownership and control can create severe agency problems. For example, the agency conflict between powerful managers and dispersed shareholders is typical in Anglo-Saxon countries, while the conflict between controlling shareholders and minority shareholders appears to be frequent in European countries. These agency problems, in turn, impair corporate performance. Since good corporate governance can alleviate agency problems, incentivise businesses to take the right decision, and improve performance, governments across the world have attempted to carry out a series of corporate governance reforms.

Among various institutions, the board of directors is usually seen as a key part of the governance reform. There are two main reasons for this. First, in the past few years, several corporate scandals, such as Enron-WorldCom and Volkswagen in US and BP in UK, have pointed out boards' inadequate scrutiny of firms and the failure of the corporate governance (Augar, 2017). Second, the global financial crisis in 2008 highlighted that the lack of effective monitoring mechanism contributed to the failure of some companies. In particular, boards failed in their responsibility for proper oversight of risk management and to implement risk control procedures effectively (Kumar and Singh, 2013). Given these striking facts, authorities have called for more accountable boards in modern corporations, in order to improve corporate governance.

The academic research on board of directors mainly originated from agency theory. From the contractual view, the shareholders (principal) invest in the firm and delegate a professional manager (agent) to run the firm on their behalf. This separation of ownership and control is the essence of the agency problem, first identified by Berle and Means

(1932) and then is developed by Jensen and Meckling (1976) and Fama and Jensen (1983). Since the contract between shareholders and managers is incomplete (Shleifer and Vishny, 1997) and managers possess superior information and expertise about the firm, managers usually end up with significant residual rights of control. In this way, moral hazard occurs when managers expropriate shareholders' values to maximize their own utilities rather than serve the interests of shareholders, such as shirking and entrenchment. Within this framework, the board of directors is designed to align the managers' interests with those of shareholders as an active monitor.

There is a large discussion on how board of directors might alleviate the agency problem. In principle, the board of directors is expected to monitor and control the management on behalf of shareholders from the agency perspective. Boards are in charge of executive compensation and have the power to hire and fire top level managers, ratify important decisions and set strategies (e.g., Fama and Jensen, 1983; Tirole, 2001). Therefore, the decision control right of the board can ensure the separation of control and decision management at the top level of the firm. Additionally, the board of directors can also provide valuable advice and external resources to the management to improve information quality based on the resource dependence theory (e.g., Anderson et al., 2011; Hermalin and Weisbach, 2003; Pfeffer and Salacik, 1978).

Given these functions, awareness about the role of board of directors in firms has increased in empirical research. The existing literature can be divided into three main streams. The first branch addresses the influence of board characteristics on firm performance. In particular, the impact of board functions, such as board meeting (e.g., Schwartz-Ziv and Weisbach, 2013; Vafeas, 1999), and board composition, such as board size, board independence, board connection and board diversity (e.g., Adams and Ferreira; Cater et al., 2010; Cheng, 2008; Falato et al., 2014; Frijins et al., 2016; Liu et al., 2015; Sila et al., 2016; Yermack, 1996) on firm strategies, profitability and risk are widely

discussed topics. The second branch focuses on the impact of board of directors on tasks assigned to directors, such as CEOs (Chief Executive Officers) turnover, hostile takeover and executive compensation (e.g., Chhaochharia and Grinstein, 2009; Guo and Masulis, 2015; Renneboog and Zhao, 2014; Weisbach, 1988). The third branch reviews the factors that affect board composition (e.g., Baker and Gompers, 2003; Jenter and Kanaan, 2015; Linck et al., 2008), which identifies board dynamics and the power struggle between the CEO and the board.

However, prior studies on the role of boards of directors have devoted limited attention to emerging markets, where the corporate governance and investor protection appear to be weaker than that of developed economies. To shed light on this issue in emerging markets, China provides an ideal context for exploring the role of boards of directors. First, as a major emerging economy, China has gained an increasing influence in the world economy, though the corporate governance is very weak. In particular, the legal environment is still poor in China. The protection of investors, especially minority shareholders, is weak and law enforcement is ineffective. Additionally, unlike other western countries, institutional investors are less likely to monitor the firm, since China has a concentrated ownership structure where institutional investors only hold a small part of shares.

Second, the Chinese government has attempted to intensively reform the governance system in past years where the board of directors has been considered to be at the heart of the reform. After joining the World Trade Organization in 2001, China placed corporate governance as the centre of economic reform. “The Principles of Corporate Governance” enacted by the Organization for Economic Co-operation and Development (OECD) was adopted in 2001, followed by a series of regulations. For example, the Chinese Security Regulatory Commission (CSRC) published the guidelines for independent directors of listed firms in August, 2001. To accelerate the governance reform, in 2002, CSRC and

the State Economic and Trade Commission issued the "Code of Corporate Governance for Listed Companies" which outlined the importance and rules of boards of directors. For example, board size is required to range from 5 to 19 and independent directors should account for one-third of the board since 2003. In addition, the board is required to implement shareholders' resolutions, make major decisions and hold meetings. Under these governance codes, it is of importance to explore the changes and effectiveness of boards of directors in Chinese firms.

Lastly, government intervention is prevalent in Chinese listed firms. There are two distinctive features of Chinese firms. One is that the majority of listed firms are former state-owned enterprises (SOEs); the other is that the government still impose tight controls on listed firms even after the split-share structure reform. Compared to private firms, state-owned firms have divergent primary goals. For example, state-owned firms are directed to pursue social and political objectives while private firms are profit-driven. In addition, state ownership can also discourage monitoring and develop agency problems as residual cash flow claims of state firms are not readily transferable (Borisova et al., 2012; Dewenter and Malatesta, 2001). This, in turn, provides an interesting setting for comparing the differences in the role of boards of directors in state-owned firms and private firms.

1.2 Motivations, research questions and data

This thesis provides a new insight into the role of boards of directors in China. Three major research questions relating to boards of directors are investigated. In particular, the first two questions are about the interaction of directors. I first look at the age diversity of directors and then focus on peer competition among executives. In the last question, I focus on two important characteristics of boards of directors, namely board independence and board size.

First, how and why does board age diversity affect bank performance? Bank governance

has received increased attention in the wake of the 2008 financial crisis, since poor bank governance is more likely to trigger a bank failure and lead to a spillover effect on other financial institutions as well as on the whole economy (e.g., Haan & Vlahu, 2016; Pathan & Faff, 2013). Given the complexity of bank operations and opacity in bank lending activities, the role of bank directors is especially important (Levine, 2004). Compared to non-financial firms, bank directors' roles are more complicated as they should align the manager not only with the interests of shareholders but also with that of depositors. In 2014, the Basel Committee on Banking Supervision (BCBS) released guidelines on bank governance, pointing out the importance of board diversity in banks. In the previous literature, directors' attributes, such as gender and ethnicity, have been largely explored in both financial and non-financial firms. However, the key diversity dimension of age, which can capture an individual's life experience (Mannheim, 1949) and encompasses a wide range of factors that influence the formation of personal values during our lifespan (Medawar, 1952; Rhodes, 1983), has so far attracted limited attention in the finance literature. Whether an age-diverse board provides comprehensive resources and expertise or leads to communication breakdown and conflicts remains an open question. Therefore, Chapter 2 looks at the board age diversity in Chinese banks and investigates how and why it could affect bank profitability and risk.

Second, how does age heterogeneity of non-CEO executives affect the relationship between tournament incentives and firm performance? The excessive remuneration of CEOs shapes the debate on the workplace wage inequality in the media and has also triggered a large amount of research investigating the role of compensation gap between CEOs and other executives. Most empirical studies support the tournament theory that a huge pay gap provides inherent incentives for non-CEO executives to expend more efforts, and improve firm performance (Lazear and Rosen, 1981). While researchers have begun to explore whether the characteristic of the CEO can affect this tournament effect, no previous study has investigated the tournament effect through non-CEO executives, who

occupy important positions in the top management team (Pissaris et al., 2015) and are also the key objects of tournament incentives. To compete for the same tournament prize (pay gap), non-CEO executives can be viewed as an appropriate peer group and the degree of peer competition might depend on the demographic characteristics of non-CEO executives. Among different characteristics, age is found to have some influence on peer competition based on previous studies in psychology and management (e.g., Kunze et al., 2013; Liu and Lafreniere, 2014). In particular, similar-aged individuals usually compete more fervently with each other for limited resources, while people of different age appear to compete less due to biased career opportunities caused by unbalanced human and social capital. Therefore, Chapter 3 focuses on the age cohort composition of non-CEO executives and estimates whether this can enhance or diminish the tournament competition.

Third, do board characteristics encourage excessive risk-taking in state-owned firms? Issues relating to debt financing and state ownership have received considerable attention. The previous literature provides a range of empirical evidence that state-owned firms have lower cost of debt in debt financing due to implicit guarantees by the government. Given the favorable borrowing cost, it might be the case that state-owned firms will take on excessive leverage and hold less cash in hand, resulting in higher risk. Therefore, there is an important concern regarding whether state firms take excessive risks in debt financing decisions, compared to private firms (an issue that has not been thoroughly explored in the previous literature). Given the potential for excessive risk-taking in state-owned firms, this raises another concern regarding how to reduce this risk. In state firms, the separation of ownership and control leads to conflicts between shareholders and managers. Further, the ownership concentration can also turn the agency problem into conflicts between the controlling shareholders and the minority shareholders. Furthermore, there is one more type of agency problem between the state and the controlling owner (Ding et al., 2007). As a consequence, state firms have more severe

agency problems (Dewenter and Malatesta, 2001) than private firms. Based on agency theory, the board of directors is an important internal mechanism to mitigate the agency problem (Fama and Jensen, 1983). Therefore, it is important to examine whether the board of directors can reduce excessive risk-taking behaviour in state-owned firms. Unlike western firms, Chinese firms normally have a distinctively concentrated ownership with a large government stake. In addition, debt financing is an important finance source for Chinese listed firms (Shailer and Wang, 2014). Based on these facts and concerns, Chapter 4 aims to investigate the excessive risk-taking behaviours in the debt financing decision of Chinese state-owned firms and then explore whether board independence and board size can affect excessive risk-taking in state firms.

To address all the research questions, several datasets from China are employed in this thesis. In Chapter 2, bank-specific financial data are extracted from Bankscope and data on board and ownership structure are hand collected from each individual bank's annual report. The World Values Survey is also utilized to predict bank directors' personal values. The final estimation sample in Chapter 2 consists of 97 Chinese banks from 2009 to 2013. In Chapters 3 and 4, CSMAR is the main dataset, which provides the firm-level financial information and governance variables for Chinese firms listed on either the Shanghai or the Shenzhen Stock Exchange. The estimation sample of Chapter 3 includes 18,989 firm-year observations, encompassing 2,600 Chinese listed firms from 2005 to 2015, while the sample of Chapter 4 consists of 2,294 firms from 2002 to 2015.

It is of importance to show the characteristics of the data employed in this thesis, which provide a general picture of the empirical analysis of subsequent chapters. Figure 1.1 presents the distribution of directors' age in Chinese banks over time from 2009 to 2013. Most directors are aged from around 30 to 70, and therefore grew up in Mao Zedong's or Deng Xiaoping's era. In particular, the youngest director is 29 years old, while the oldest one is 83 years old. The average age of directors is 51.95 years old, with the majority of

directors in Chinese banks in their forties and fifties. In general, directors in Chinese banks are found to be heterogeneous in age.

<Insert Figure 1.1 here>

Figure 1.2 shows the cohort composition of non-CEO executives in non-financial firms in China. Following previous studies (Egri and Ralston, 2004; Ralston et al., 1999), non-CEO executives are divided into four cohorts corresponding to specific social and political events based on their birth year, namely 1926 – 1947 cohort (the Communist Consolidation generation), 1947 – 1958 cohort (the Cultural Revolution generation), 1958 – 1974 cohort (the Social Reform generation) and 1974 – 1992 cohort (the Societal generation). In Figure 1.2, one cohort composition remains stable at around 20 percent with a slight increase, while the percentage of non-CEO executive with three or four age cohorts fluctuates between around 20% and 30% from 2005 to 2015. In addition, non-CEO executives who are from any two different cohorts account for more than half of the whole sample. Thus, it can be concluded that age heterogeneity exists among non-CEO executives.

<Insert Figure 1.2 here>

Furthermore, Figure 1.3 depicts the annual change of board independence and board size in Chinese non-financial firms during the period from 2002 to 2015. In line with the Chinese governance regulation that board independence should account for one third of the board, an increase in the percentage of independent directors of listed firms from 2002 is observed. In particular, independent directors accounts for around 33.14% of all directors in 2003. Notably, the upward trend of the board independence slowed down after 2003. Panel B of Figure 1.3 suggests that the board size started to shrink in 2003. More specifically, the number of directors reduced to around 8.63 in 2015 from 9.80 in 2003, which is consistent with the regulation that the board should consist of 5 to 9 directors in Chinese firms. Therefore, the implementation of board reform provides an ideal opportunity to estimate the role of board independence and board size in Chinese firms.

<Insert Figure 1.3 here>

1.3 Summary and contributions

Chapter 2 examines the effect of board age diversity on bank profitability and risk. Previous literature has documented mixed evidence of the impact of board diversity on firm performance. On the one hand, board diversity could bring more ultimate outsiders into boards and enhance mutual monitoring, based on agency theory (Kandel & Lazear, 1992; Wiersema & Bantel, 1992); expand board member networks and contacts according to resource dependence theory (Pfeffer & Salancik, 1978); and provide comprehensive and unique human capital in the boardroom grounded in human capital theory (Becker, 1964; Terjesen et al., 2010). On the other hand, social psychology theories argue that board diversity could generate conflicts and protract decision-making processes (Byrne, 1971; Williams & O'Reilly, 1996).

Employing a sample of 97 Chinese banks from 2009 to 2013, the result suggests a negative relationship between age diversity and bank profitability, which is largely in line with a study on bank board diversity (Hagendorff and Keasey, 2012) and the strand of literature in non-bank samples. To further investigate why board age diversity negatively affects bank profitability, directors' ages are linked to directors' personal values. Since people's values are not observable, I construct the measure of directors' values on work-related indicators by utilizing the World Values Survey. After this, the propensity score matching method is employed to predict individual bank directors' personal values. The results show that heterogeneity in directors' values on risk, prudence, and wealth creates additional obstacles for the efficient functioning of corporate boards and reduces banks' profitability, while the variations in directors' value on success, creativity, and slackness have no influence on bank performance. In addition, the results are robust after addressing the potential endogeneity concern by employing he fixed effect instrumental variable approach using Lewbel's (2012) method and the dynamic panel Generalized Methods of

Moment (GMM) analysis.

Chapter 3 investigates the role of age heterogeneity of non-CEO executives in the relationship between tournament incentives and firm performance. There are two alternative views regarding this issue. Based on seniority argument, elder people often occupy the top positions due to their rich experience and great influence in their field (Chen and Chung, 2012), which can lead to reduced incentives for younger people who might also anticipate lower probability of promotion in the workplace. In this case, younger executives might be discouraged from competing with older ones unless they have extremely outstanding talents and managerial abilities. In contrast, social category theory (Turner, 1985) and similarity-attraction theory (Byrne, 1971) together suggest that similar-aged individuals usually group themselves into the same social category with a greater perception of fairness. Non-CEO executives with similar ages might think that they have equal or similar chances of promotion and then compete more fervently, which consequently strengthens the tournament effect.

Using a sample of Chinese firms from 2005 to 2015, a significant and positive relationship between executive compensation gap and firm performance is documented, which is consistent with the implication of tournament theory. Furthermore, the tournament effect becomes weaker when non-CEO executives come from three or more age cohorts, while it is stronger when the non-CEO executives are from the same age cohort. In addition, the impact of age heterogeneity on tournament effect is more pronounced in state firms than private firms. This suggests that the outmoded idea of seniority is overstressed in Chinese state firms. The analysis is also robust when controlling for the endogeneity problem and for several alternative measures of tournament incentives, age heterogeneity and firm performance.

Chapter 4 examines the impact of board characteristics on excessive risk-taking in debt financing decisions of state-owned firms. Based on agency theory, board independence,

which provides effective monitoring and control of management (Fama and Jensen, 1983), can signal a high quality of board and hence reduce the cost of debt and cash holdings and increase leverage (Anderson et al., 2014; Fields et al., 2012; Kuan et al., 2011). In terms of board size, larger boards might be able to inject more valuable resources into the firm (Dalton et al., 1999) and improve information quality of the board, which could lead to lower borrowing cost and fewer loan covenants (Fields et al., 2012). However, large boards that have more than seven or eight directors tend to function less effectively, though being more controllable for CEOs (Jensen, 1993). As the board becomes larger, the monitoring offered by the directors might become less effective because of the free rider problem (Raheja, 2005). Given the benefits and costs of large boards, the effect of board size on the excessive risk in debt financing in state firms could be either positive or negative.

Using a sample of 2,294 Chinese firms between 2002 and 2015, the findings first show that state-owned firms have lower cost of debt than private firms. Second, I follow Gao et al. (2013) to construct the measures of excess risk indicators, namely, excess leverage and excess cash holdings. The results show that state firms indeed take excessive risk in debt financing decisions. On average, there is greater evidence of positive excess leverage and negative excess cash holdings in state firms. Third, board characteristics are found to affect excessive risk-taking in state firms. In particular, the proportion of independent directors is negatively associated with an excess cost of debt but positively related to excess leverage, while board size has positive impacts on the excess cost of debt, leverage and cash holdings. These findings are robust to alternative econometric methods and measures.

In summary, this thesis makes several contributions to the academic literature on board of directors, tournament incentives and debt financing. Chapter 2 contributes to the existing literature on board diversity in several ways. First, it provides a new insight into

the relationship between board age heterogeneity and firm performance. Prior studies have only focused on the direct impact of age diversity among directors on organizational outcomes (Ali et al., 2014; Ararat et al., 2010; Goergen et al., 2015; Hafsi & Turgut, 2013; Mahadeo et al., 2012; Tarus & Aime, 2014). However, Chapter 2 takes the research a step further to examine why age diversity can affect bank performance by introducing directors' personal values, an unobservable dimension of diversity. Second, to the best of my knowledge, this is the first study to impute directors' personal values and to provide new empirical evidence that directors' values change across generations. Finally, empirical studies on board diversity and bank performance are extended to China where limited attention has been paid to bank boards, the only extant study being by Liang et al. (2013), who focus on the impact of board composition and directors' political connections on bank performance.

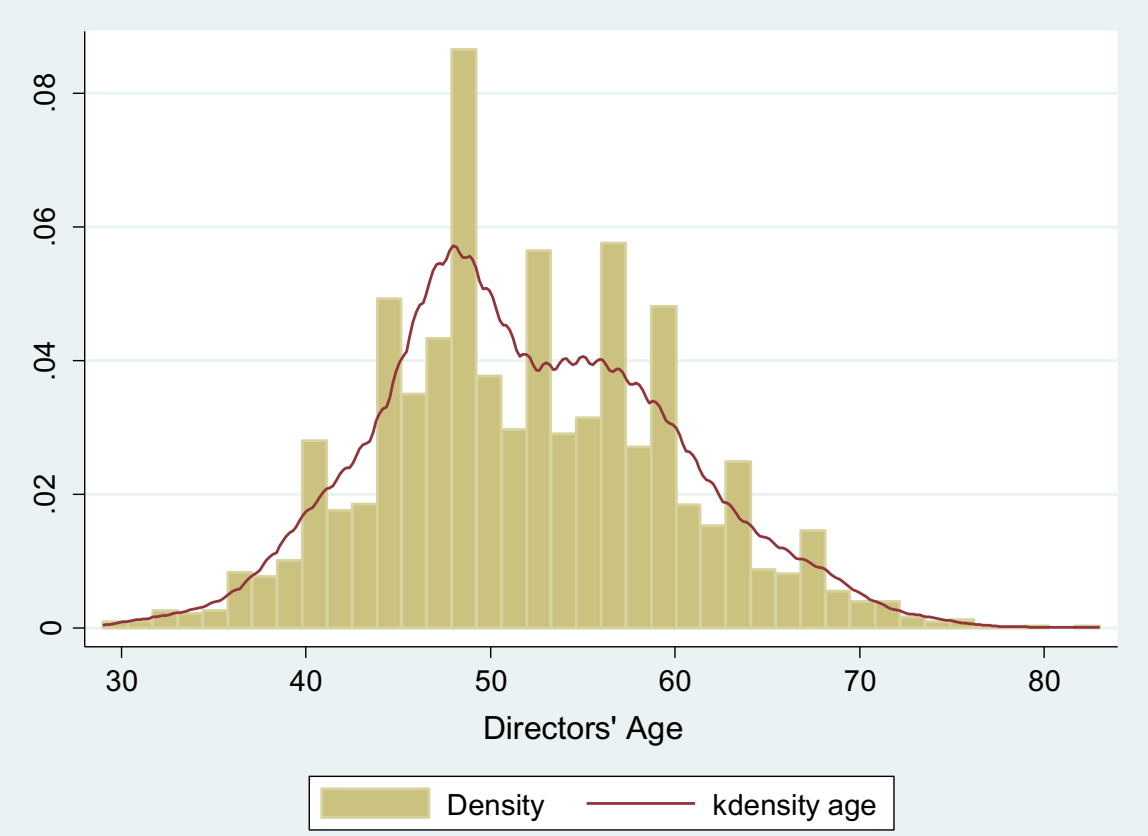
Chapter 3 contributes to tournament literature in two ways. First, it provides a new insight into the tournament effect by introducing the interaction of non-CEO executives. Previous studies on executive compensation explore the link between pay gap and firm performance only through industry environment (Siegel and Hambrick, 2005), ownership structure (Hu et al., 2013; Lee et al., 2008) and CEOs' background (Kale et al., 2009; Zalewska, 2014). In contrast, Chapter 3 focuses on a new channel, the age heterogeneity of non-CEO executives, and investigates how it affects the tournament effect. Second, this work also contributes to the compensation literature by linking society hierarchy to tournament incentives and providing empirical evidence on the hierarchy issue in China. Given the large population and limited resources in China, competition is strong, especially among similar-aged peers as they seek to acquire the same resources simultaneously (Liu and Lafreniere, 2014). Particular to Chinese culture, there is a high value placed on seniority. Based on the Five Code of Ethics by Confucian, there is an age hierarchical structure of human relationship. Elderly people usually enjoy the high status and the most valuable resources (Bond and Hwang, 1986).

Chapter 4 contributes to the existing literature on debt financing and state ownership in two ways. First, it provides a new perspective to the study of debt financing in state-owned firms. Prior studies usually focus on the effect of state ownership on cost of debt, leverage and cash holdings (e.g., Borisova and Megginson, 2011; Borisova et al., 2015; Dewentwe and Malatesta, 2001; Shailer and Wang, 2014). However,, this study predicts the leverage, cash holdings and cost of debt that state firms are likely to have by employing a propensity score matching method and then examine the difference between the predicted and observable values of leverage, cash holdings and cost of debt in state-owned firms, namely, excess leverage, excess cash holdings and excess cost of debt. By doing this, excessive risk-taking in debt financing decisions in state-owned firms compared to private firms has been identified. Second, to the best of my knowledge, this is the first empirical study to provide a comprehensive perspective on the relationship between board characteristics and excessive managerial risk only in state-owned firms rather than private firms.

1.4 Structure of the thesis

The thesis is organised as follows. Chapter 2 investigates the effect of board age diversity on Chinese bank performance. Chapter 3 discusses the role of age heterogeneity of non-CEO executives in the relationship between tournament incentives and firm performance. Chapter 4 examines the relationship between board characteristics and excessive risk-taking behavior in state-owned firms. Concluding remarks and implications are provided in Chapter 5.

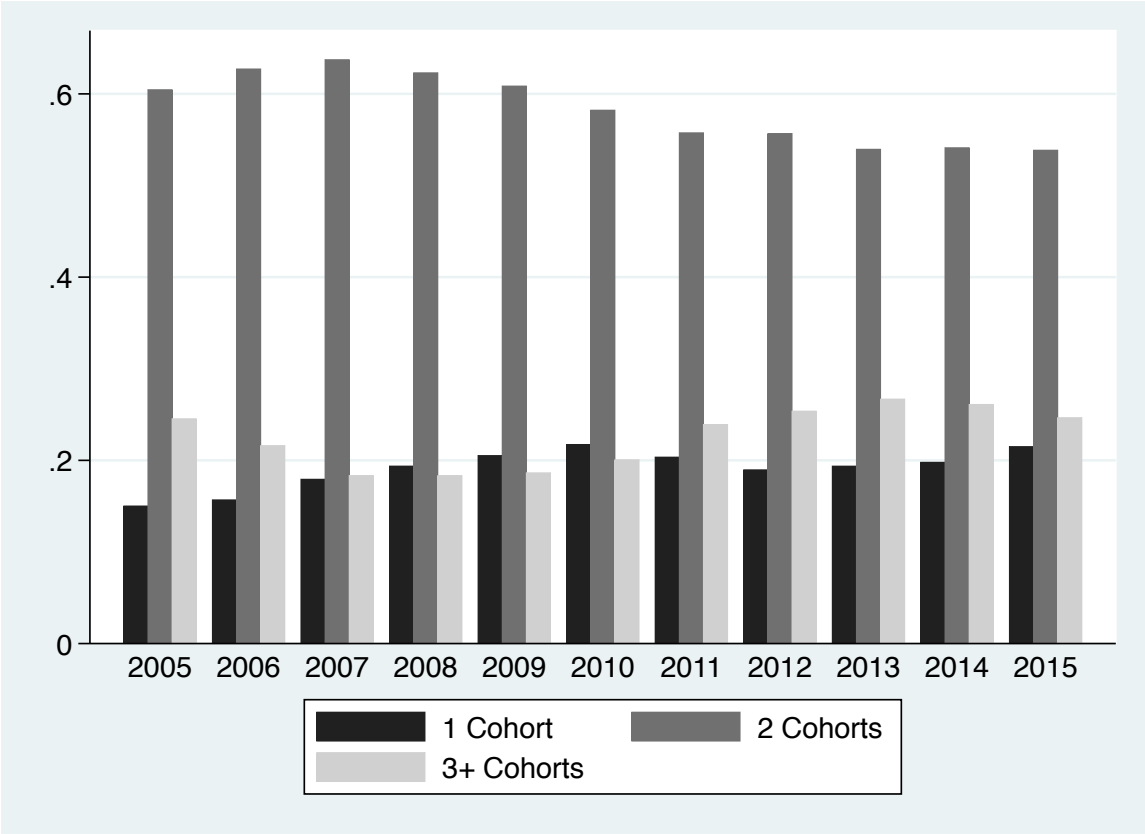
Figure 1.1 Distribution of Directors' Age in Chinese Banks from 2009- 2013



Source: Chinese bank annual report (2009, 2010, 2011, 2012 and 2013)

Notes: This figure reports the distribution of directors' age in Chinese banks.

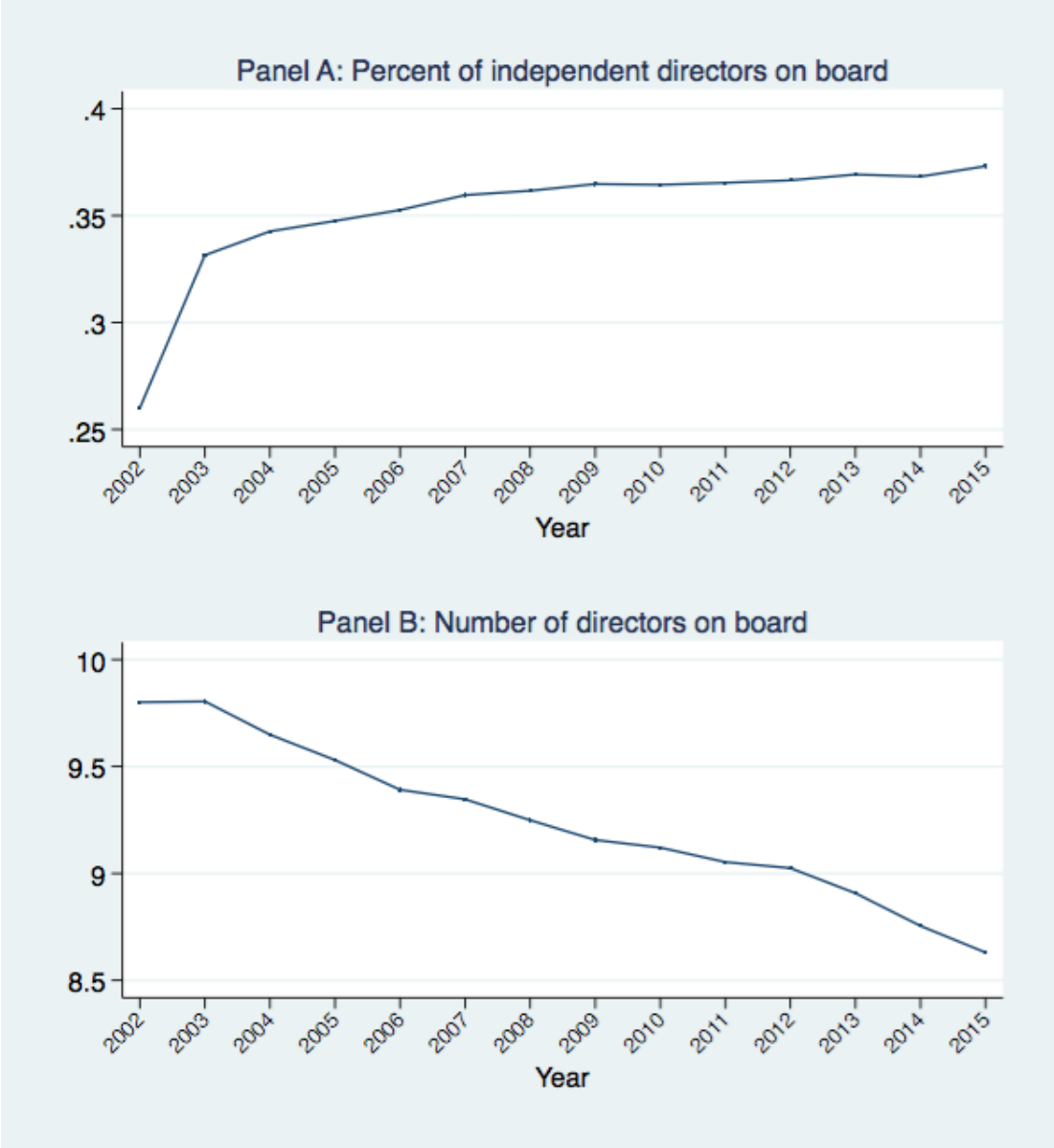
Figure 1.2 Percentage of firms with non-CEO executive from different cohort composition



Source: CSMAR (2005-2015)

Notes: This figure reports the percentage of firms with non-CEO executives from different cohort composition in China from 2005 to 2015. In this study, executives are divided into four cohorts based on their birth year: 1926-1947 cohort, 1948-1958 cohort, 1959-1974 cohort and 1975-1992 cohort. 1 Cohort means that non-CEO executives are from the same cohorts. 2 Cohorts means that non-CEO executives come from any two different cohorts. 3+ Cohorts refers to that non-CEO executives are from any three or four cohorts.

Figure 1.3 Annual change of board independence of board size of Chinese firms, 2002-2015



Notes: This figure shows the annual trend of the percentage of independent directors and number of directors of Chinese firms from 2002 to 2015 in Panel A and B, respectively.

Chapter 2 Age diversity, directors' personal values, and bank performance[1]

2.1 Introduction

Corporate governance in banks has received increasing attention in the wake of the 2008 financial crisis. Notably, poor bank governance is more likely to trigger a bank failure, leading to serious systemic risk and negative externalities (e.g., Haan and Vlahu, 2016; Pathan and Faff, 2013). The Basel Committee on Banking Supervision (BCBS) recently issued a set of "Guidelines on Corporate Governance Principles for Banks" to emphasize the importance of effective governance for sound functioning of banks and the economy as a whole (BCBS, 2014). The report expands guidance on the roles of board of directors, specifically pointing out that the bank board should be composed of a diverse set of directors to reflect its complexity in operation.

Compared with other attributes of directors (i.e., gender and ethnicity),[2] age, which is a key diversity dimension, so far has attracted little attention in the finance literature. When profiling an individual, age is a dynamic proxy of an individual's life experience (Mannheim, 1949) and encompasses a wide range of factors that influence the formation of personal values during our lifespan (Medawar, 1952; Rhodes, 1983). Whether an age-diverse board provides comprehensive resources and expertise or leads to communication breakdown and conflicts remains as an open question. To date, however, studies on board diversity in banks have largely focused on developed countries (e.g., Adams and Mehran, 2012; Farag and Mallin, 2017; García-Meca et al., 2015; Hagendorff and Keasey, 2012).

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[1] This chapter is published at *International Review of Financial analysis*. https://doi.org/10.1016/j.irfa.2017.10.007

[2] Increasing attention has been recognized to board diversities by gender (Erhardt et al., 2003; Farag & Malin, 2017; Liu et al., 2014; Sila et al., 2016), nationality (Ruigrok et al., 2007 and García-Meca et al., 2015) and ethnicity (Cater et al., 2003; Cater et al., 2010) for both financial and non-financial firms.

To shed light on this issue in emerging markets in which the banking sector grows faster than their developed world counterparts, we choose to explore China as a context for board age diversity. [3]

China, as a major emerging economy, has gained an increased influence in the world economy. The Chinese banking sector has surpassed that of Eurozone to become the world's largest by size. At the end of 2016, the total assets of the Chinese banking system hit $33 trillion (versus $31 trillion for the Eurozone). Furthermore, banks in China dominate the financial system, and the value of the Chinese banking system reached more than three times the size of China's annual economic outputs in 2016. Given the huge size and unique position in the economy, the Chinese banking sector has gained an increased influence in the world financial system. Compared to developed markets, the board of directors in China plays an important role through its advising and monitoring activities in an environment with weak institutions and weak investor protections. Different from other emerging markets such as Eastern European countries, the gradual reform approach taken by the Chinese government (Jiang et al., 2009) provides us a chance to explore the diversity among directors of different ages who have experienced reform over time. We hope that our results can be generalized to other emerging markets that have experienced similar degrees of cultural, social, and economic reforms.

Age diversity is particularly important in countries that have experienced significant transformations over a relatively short period of time. Along with the transition of the economic system, there has simultaneously been a push towards cultural change (Stulz and Williamson, 2003). For example, in China, under Chairman Mao's socialist

[3] Chinese banks have a two-tier board system, including a board of directors and a board of supervisors. This study focuses on the board of directors, which is more functional, while the supervisory board seems to be decorative and is regarded as a "nominal organ" in China (e.g., Tam, 1995; Dahya et al., 2003).

orthodoxy,[4] people are more likely to be less educated and are dedicated to a conventional way of doing things, sacrificing creativity (Ralston et al., 1999). While under Deng Xiaoping's modern policies, people are likely to be better educated, more qualified, confident, and individualistic and place emphasis on innovation and creativity (Huang et al., 2015; Tian, 1998; Vohra, 2000). Therefore, growing up in each distinctive cultural environment, the Chinese directors in different age cohorts tend to hold diverse values that can affect the quality and process of decision-marking.[5]

To study the link between board age diversity and bank performance, we examine a sample of 97 Chinese banks over the period from 2009 to 2013. To date, very little is known about why age diversity may affect bank performance. To further investigate this relationship, we link directors' age to directors' personal values. Given the fact that individuals' values are not observable, we utilize the World Values Survey to construct the measure of directors' values on work-related indicators.[6] We first employ the propensity score matching method to identify a matched subgroup of respondents in the survey who have similar characteristics with bank directors in our sample. We then use the estimated parameters based on this matched subgroup combined with our individual bank directors' characteristics to compute individual bank directors' values.

We document a negative relationship between age diversity and bank profitability measured by return on assets (*ROA*) and return on equity (*ROE*), indicating that the costs

[4] In 1949, the Chinese Civil War ended with Mao Zedong's Communist Party in power. Mao's era covers Communist Consolidation (1949-1965) and Great Cultural Revolution (1966-1976), while Deng Xiaoping initiated the Social Reform Era (1978-1992) and part of the Societal Transition Era (1992-now) (Ralston et al., 1999; Egri and Ralston, 2004; Sun and Wang, 2010).

[5] Regarding other dimensions of board diversity, our sample shows that directors in Chinese banks are homogeneous in nationality and ethnicity, and a small proportion of directors are female.

[6] 17 value indicators are extracted from the World Values Survey: risk, work, happiness, prudence, wealth, success, thoroughness, pressure, outgoing, active, creativity, helping others, finding faults, reserved, life satisfaction, slackness, and tension.

of age diversity outweigh its benefits on bank profitability in China. To address the potential endogeneity problem, we employ the fixed effect instrumental variable approach using Lewbel's (2012) method and the dynamic panel Generalized Methods of Moment (GMM) analysis and obtain consistent results. When decomposing age diversity into value diversity, we find that the heterogeneity in directors' values on risk, prudence, and wealth creates additional obstacles for efficient functioning of corporate boards and reduces banks' profitability, while the variations in directors' value on success, creativity, and slackness fail to have any influence on bank performance.

Our study contributes to the existing literature in several ways. First, our work offers a new perspective in understanding the impact of board age heterogeneity on firm performance. Earlier literature mostly focuses on the direct relationship between age diversity among directors and organizational outcomes (Ali et al., 2014; Ararat et al., 2010; Goergen et al., 2015; Hafsi and Turgut, 2013; Mahadeo et al., 2012; Tarus and Aime, 2014). Our work takes a step further to examine why age diversity can affect bank performance by introducing directors' personal values, an unobservable dimension of diversity. Second, to the best of our knowledge, this is the first study to compute directors' personal values and provide empirical evidence that directors' values change across generations. Finally, we provide the first empirical study on board age (value) diversity and bank performance in China. The banking sector serves as an engine of economy growth in China and has undergone governance reform with special emphasis on boards. However, existing studies on bank boards in China are very limited; note that there is a single exception (i.e., Liang et al., 2013) on board composition and directors' political connections with bank performance.

The rest of the paper proceeds as follows. Section 2.2 introduces the institutional background of the Chinese banking sector. Section 2.3 discusses the theoretical perspective of board diversity, followed by the hypothesis development on board age

diversity, value diversity, and bank performance in Section 2.4. Section 2.5 describes the data collection procedure and methodology. Section 2.6 presents the main results and is followed by a series of robustness tests in Section 2.7. Section 2.8 offers a summary and the conclusions.

2.2 Institutional background

The Chinese banking sector has experienced a series of reforms over the last forty years, transferring from a monopolistic and policy-driven system to a multi-ownership and market-oriented one. In the first period of reform (1979-1994), the Chinese banking sector has undergone an institutional restructuring and created the "two-tier" banking system, including the People's Bank of China (the central bank) and four large state-owned commercial banks (SOCBs): Industrial and Commercial Bank of China (ICBC), China Construction Bank of China (CCBC), Bank of China (BOC), and Agricultural Bank of China (ABC). Between 1985 and 1992, a more intensely competitive environment was created with the establishment of a number of nationwide and regional joint-stock commercial banks whose main objective was profit maximization.

In the second period of reform (1994-2002), Chinese banks were commercialized even further. In 1995, the Chinese authorities merged the urban credit cooperatives into city commercial banks (CCBs). In the same year, the *Commercial Banking Law* was put into effect, which requires having a board of directors with professional knowledge when setting up commercial banks. In 2002, the People's Bank of China issued *Guidance on Independent Directors and External Supervisors of Joint-Stock Commercial Banks* to establish and enhance the arrangements of independent directors (e.g., experience, expertise, independence).

In the final period (2003 – present), Chinese banks have been experienced on-going deep governance reform. In 2003, the China Banking Regulatory Commission (CBRC), the

banking regulatory body, was set up to take the overall responsibilities of formulating rules and regulations, supervising the banking sector and enhancing corporate governance. The SOCBs were restructured into modern joint-stock firms with sound corporate governance and were listed on the national and international stock exchanges. Apart from the privatization of SOCBs, foreign strategic investors were encouraged to bring capital and advanced governance into the Chinese banks.

The board has been placed as a key in the bank governance reform in China. The *Corporate Law* requires banks to establish a two-tire board structure, including a board of directors and a supervisory board. As the *Company Law* does not subject supervisors to any legal liability, the supervisory board, so far, seems to be more decorative and is regarded as a "nominal organ" in China (e.g., Chen et al., 2006; Dahya et al., 2003; Tam, 1995). To improve the effectiveness of the board of directors, the CBRC issued a series of guidelines on bank governance.[7] The board of directors is ultimately responsible for the operation and management of a commercial bank. In addition to the responsibilities stipulated in the laws and regulations (e.g., *Corporate Law* and rules for commercial banks), the bank board should also develop the operation and development strategy and monitor its implementation. In addition to its monitoring and advising roles, the board also involves in risk management, setting internal control policies, capital planning, and taking the ultimate responsibility for the management of the capital adequacy ratio. Besides shareholders, the board should also safeguard the interest of depositors and other stakeholders.

Previous studies on corporate governance in Chinese banks have mainly focused on the ownership structure (e.g., Berger et al., 2009; Dong et al., 2014; Jiang et al., 2013; Lin and Zhang, 2009). Researchers have only recently started to explore the role of bank

[7] The CBRC issued the "Guidelines on Board of Directors of Joint Stock Commercial Banks" in 2005 and "Pilot Measures for Evaluating the Performance of Directors of Commercial Banks" in 2010.

boards. Liang et al. (2013) find that board meetings and independence are positively related with performance, while board size poses a negative effect. Qian et al. (2015) find that banks with more politically connected directors exhibit lower prudential behavior. So far, no study has investigated board diversity in Chinese banks.

2.3 Theoretical perspective on board diversity

Existing theoretical framework on the relationship between board diversity and firm performance is not based on a single theory, but instead draws on various perspectives including agency theory, resource dependency theory, human capital theory, and social psychology theory.

Based on agency theory, the board of directors is an important internal mechanism to mitigate the conflicts between shareholders and managers (Fama and Jensen, 1983). Board diversity can increase board independence, since diversity can bring more ultimate outsiders into boards and enhance mutual monitoring (Kandel and Lazear, 1992; Wiersema and Bantel, 1992). An appropriate mix of diverse directors can better exercise their monitoring role when they provide high-quality and impartial advice. However, Cater et al. (2003) and Hermalin and Weisbach (2000) argue that agency theory does not provide a clear prediction, since board diversity may not lead to more effective monitoring because diverse board members may be marginalized.

According to resource dependence theory (Pfeffer and Salancik, 1978), firms depend on their external environment to survive. The key to reduce the dependencies is to establish a linkage with external entities and acquire resources. In this process, the corporate board occupies an important role: it is the provider of advice and counsel, legitimacy and communication channels (Pfeffer and Salancik, 1978). Directors of different ages expand the board member networks and contacts. The network may lead firms to benefit from improved access to their external constituents (Hillam et al., 2000). Specifically, the

network of an age-diverse board may provide better access to capital and regulators (Macey and O'Hara, 2003) and enable the bank to meet the needs of different customers and penetrate deeper into the market (Mishra and Jhunjhunwala, 2013).

Human capital theory complements resource dependence theory in some aspects. Directors with different educational background, knowledge, skills, and experiences provide their own unique human capital to the boardroom, which benefits the outcome of the firm (Becker, 1964; Terjesen et al., 2009). Older directors tend to be more knowledgeable and experienced, while younger directors are more energetic and have a greater appetite for adventures and new technologies (Mishra and Jhunjhunwala, 2013). Therefore, an age-diverse board may further an organization's understanding of its current marketplace and industry dynamics and improve its performance.

In contrast, board age diversity may come at a cost and hamper firm performance. On the basis of the "similarity-attraction paradigm" (Byrne, 1971), individuals perceive other people who are demographically different from them as "outsiders". People tend to be reluctant to share information with "outside" individuals, leading to interpersonal attraction breakdown (Adams et al., 2010; Estélyi and Nisar, 2016). According to social psychology theories, when it comes to boards, different perspectives and cognitive abilities in the board may generate conflicts among different groups of directors (Byrne, 1971; Williams and O'Reilly, 1996). Such conflicts are likely to hinder the development of boardroom cohesiveness, produce barriers for communication, protract decision-making processes, and weaken firm performance (Wang and Hsu, 2013; Westphal and Bednar, 2005).

2.4 Literature review and hypothesis development

2.4.1 Board diversity in the banking sector

Given the complexity in bank operation and opacity in bank lending activities, the role of

bank directors is especially important, as the other stakeholders are not able to impose effective governance (Levine, 2004). For example, banks rely on depositors for funding. However, it is difficult for depositors to monitor the managers because of information asymmetry and high coordination costs (Demirgüç-Kunt and Detragiache, 2002). Thus, directors in banks should align the manager not only with the interests of shareholders but also with that of depositors. Furthermore, holding a unique position in the economy, the failure of an individual bank will cause a spillover effect on other financial institutions. The banking industry is more heavily regulated than non-financial firms. Compared to non-financial firms, bank directors are subject to more scrutiny and should also be accountable to regulators. The existing literature on board diversity has largely focused on non-financial firms, while only a handful of studies provide empirical evidence on the impact of bank board diversity (i.e., gender and nationality) on financial risk (Farag and Mallin, 2017), bank performance (García-Meca et al., 2015; Pathan and Faff, 2013), and bank growth strategies (De Cabo et al., 2012).

2.4.2 Board age diversity, bank profitability, and risk

Age diversity may have positive or negative effects on bank profitability. On the one hand, age diversity may improve the experiences, resources, knowledge, and networks of the board, which in turn improve bank profitability. On the other hand, age diversity may suffer from cognitive conflicts and lower group cohesion, which harm bank profitability. The existing research on board age diversity tends to focus on non-financial firms and have so far provided mixed evidence. Some studies show that age-diverse boards lead to improved firm financial performance (Ararat et al., 2010; Kim and Lim, 2010; Mahadeo et al., 2012), while others find that age diversity weakens firm social performance (Hafsi and Turgut, 2013), profitability (Ali et al., 2014), and strategic changes (Tarus and Aime, 2014). However, the board age diversity in the banking sector has received scant attention, except for one study by Hagendorff and Keasey (2012). They examine the US commercial banks and find that board age diversity is associated with wealth losses surrounding acquisition announcements.

As mentioned earlier, the significant and gradual reform in economic system and culture over the past decades in China has shaped the generational gap. Growing up in each distinctive environment, bank directors from different generations provide different resources and perspectives to the board. Directors who are born in Chairman Mao's generation are less educated, collective and conventional, while directors in Deng's generation are innovative, individualistic and knowledgeable (Huang et al., 2015). Given the huge generation gap, Chinese directors of different ages are more likely to be reluctant to share information with each other due to the "similarity-attraction paradigm" (Byrne, 1971) and then might approach decisions differently. Hence, the conflict is more likely an issue in the board decision-making process. With the gradual transition history and current weak corporate governance system of China, age-diverse board may generate conflicts in board cohesion and have negative effect on bank profitability. Therefore, we hypothesize that:

H1: Board age diversity is negatively associated with bank profitability.

In terms of risk, no study has investigated the effect of board age diversity on firm risks. Regarding the relationship between age and risk, young managers are found to have higher propensity to make risky decisions (Cheng et al., 2010) to signal to the market that they possess superior abilities (Prendergast and Stole, 1996). Older managers prefer lower risk due to the threat to financial security and are associated with lower financial leverage, lower capital expenditures, and higher cash holdings (Berger et al., 2014; Bertrand and Schoar, 2003). However, when career concerns dominate, younger managers may be more risk-averse since they face more uncertainty about their future career than their older counterparts (Holmstrom, 1999), while older managers are not afraid of career concerns due to their cumulative human capital (Nguyen et al., 2015). At the board level, age diversity may impact the process and the quality of decision marking. As we mentioned earlier, Chinese directors have experienced the gradual and tremendous transformation in economic, politic and cultural system over time, which create the generational gap. Older

directors from Chairman Mao's generation have their unique and different experience and resources compared with younger directors born in Deng's generation. These differences, in turn, are more likely to cause conflicts and make it difficult to reach a consensus in the boardroom. The extended decision-making process may expose banks to higher risk when it could not adjust their policy in time. Therefore, under China's cultural and economic transition as well as the less developed corporate governance, we hypothesize the following:

H1b: Board age diversity is positively associated with bank risk.

2.4.3 Board value diversity, bank profitability, and risk

During the life span, ageing involves a wide range of factors that influence the development of personal values, such as risk-taking behavior, decision-making, and attitudes towards work (Child, 1974; Ferris et al., 1991; Medawar, 1952; Rhodes, 1983; Serfling, 2014; Sun and Wang, 2010). Existing studies suggest that there are significant value differences among managers across age cohorts. Younger mangers appear to be more creative with a greater risk appetite and are found to have a higher probability to challenge the existing system of company rules (Bantel and Jackson, 1989; Child, 1974; Hambrick and Mason, 1984; Mishra and Jhunjhunwala, 2013). Older mangers tend to be more cautious and conservative (Bantel and Jackson, 1989), and are more capable in dealing with external agencies such as regulators and authorities (Grove et al., 2011).

At the group level, individuals of similar age prefer to interact with those whom they perceive to be similar to them. This can be explained by the "similarity-attraction paradigm", where individuals born at similar times are more likely to develop similar views on their life experience. Such similarity, in turn, fosters interpersonal attraction, group thinking, and cooperation (Byrne, 1971; Goergen et al., 2015; Kunze et al., 2011; Zenger and Lawrence, 1989). The values of each generation change in accordance with the prevailing condition during their formative years (Inglehart, 2008). Age difference is likely to lead to variation in personal values (Bantel and Jackson, 1989; Egri and Ralston,

2004; Sun and Wang, 2010). In turn, the difference in values causes a generation gap between young and old people (Prasad, 1992).

Value diversity occurs when members of a board differ in terms of what they value, especially between young and old members. In many cases, the value difference can lead to disagreements and conflicts, which can in turn harm bank performance both in profitability and risk (Jehn et al., 1999). In China, the significant changes in economics and culture during the last decades have shaped individuals' value formation. Bank directors growing up in each distinctive generation are more likely to hold different values due to the unique social and historical events in their life stages. Older directors from Mao's generation are more likely to be risk-averse and prudential, while younger directors from Deng's generation tend to be energetic and have a greater appetite of risk due to the modern policies. Given the huge value gaps from different generations, directors might approach decisions differently, which could protract the board decision process and affect the effectiveness of the board. Under the gradual transition and the current state of weak corporate governance in China, we hence hypothesize the following:

H2a: Board value diversity negatively affects bank profitability.

H2b: Board value diversity positively affects bank risk.

2.5 Data and methodology

2.5.1 Data and sample selection

We build a sample of 97 Chinese banks during the period 2009-2013. We start with the universe of 190 Chinese banks available on Bankscope. We focus on state-owned banks, joint-stock banks, city commercial banks and rural commercial banks. To allow hand-collection of data on the board and ownership structure, we exclude banks that fail to have at least one annual report during the study period. We focus on banks that disclose directors' demographic characteristics, especially age, in their annual reports. The filtering procedure results in a final sample of 97 banks, which represents about three

quarters of the total assets of Chinese banking institutions at the end of 2013 (China Banking Regulatory Commission, 2014).

Bank-specific financial information is mainly extracted from Bankscope. We replace the missing values and questionable values in Bankscope by hand-collected data from each individual bank's annual report. Most of the banks in our sample follow the local GAAP Chinese Accounting Standards (CAS), while the listed commercial banks employ the International Financial Reporting Standards (IFRS).[8] The CAS was developed recently following the principle of IFRS, and there is no material difference between the financial statements of the same bank under IFRS and CAS (Berger et al., 2009; Liang et al., 2013). The data for the economic indicator (i.e., GDP per capita) are extracted from China City Statistical Yearbook published by China Statistics Press.

To predict individual director's values, we employ the World Values Survey Sixth Wave, a cross-country project containing information about demographics, self-reported economic information, and answers to specific questions on fifteen categories of values on the economy, work ethics, religions, democracy, and other attitudes. The China Survey was conducted in 2012 and measures values and attitudes held by Chinese citizens. The respondents are aged from 18 to 75, and they reside in all provinces of China. In our study, the World Values Survey (China 2012)[9] is employed to predict the values of Chinese directors. From this survey, we extract work-related value indicators.

Among the 6,195 directors who served on the board of sample banks, we have 177 (around 2%) foreign directors from 12 other countries/regions. To predict foreign

[8] 18 Chinese banks in our sample are listed.

[9] The World Values Survey has six waves, and each wave has a five-year period. In each wave, there is only one survey for one country. In our study, we employ the China Survey (2012), which covers most of the period (2009-2013) in our sample.

directors' values, we also download the respective 12 foreign countries/regions' World Values Surveys, including the United Kingdom, the United States, the Switzerland, Spain, the Netherlands, Taiwan, Singapore, Germany, Australia, France, Hong Kong, and Italy.

2.5.2 Model specifications and descriptive statistics

2.5.2.1 Board age diversity

To examine the impacts of board age diversity on bank performance, we employ the following Model (1):

$$Bank\ Performance_{i,t} = \alpha + \beta Board\ Age\ Diversity_{i,t-1} + X_{i,t-1}\delta + \theta_t + \mu_i + \varepsilon_{i,t} \quad (1)$$

where i is the bank identifier, and *t* is the year. Model (1) is estimated by a fixed-effects estimator, which is justified using the Hausman Test. The key coefficient of interest β captures the impact of board age diversity on bank performance. μ is an individual-specific effect that varies across banks, and θ_t is the year fixed effect. ε denotes to the error term, which varies both among banks and periods of time. All of the independent variables are lagged by one year. The reported standard errors are adjusted for potential heteroscedasticity.

$Bank\ Performance$ is captured by both profitability and risk. As for profitability, return on assets (*ROA*) is calculated as net income divided by total assets and shows how efficiently the bank produces profit by the given assets. Return on equity (*ROE*) is calculated as net income divided by total equity, assessing the return on shareholders' investment. As alternative measures, *Net Interest Margin* is measured by net interest income divided by total earning assets. Since one of a bank's primary functions is to issue liabilities and use the proceeds to purchase income-earning assets, *higher Net Interest Margin* reflects higher bank profitability. The *Pre-Provision Profit Ratio* is calculated as the difference between operating income and operating expense to total assets. The *Pre-Provision Profit Ratio* provides a reasonable estimate as to what the bank expects to have left for operating profit once it eventually incurs cash outflows due to defaulted loans. In

terms of risk, the Z-score, defined as the return on assets plus the equity-to-assets ratio divided by the standard deviation of the return on assets, is the inverse of the probability that the bank losses surmount bank capital[10] and measures the distance to default (Dong et al., 2014; Laeven and Levine, 2009). Thus, a higher Z-score indicates lower risk. Since Z-scores are highly skewed, we take the natural log of the Z-score (*Z-score*) in further analysis. We also use non-performing loan ratio (*NPLratio*), calculated as non-performing loans to total loans, as an alternative risk measure.

<Insert Table 2.1 about here>

Panel A of Table 2.1 reports the descriptive statistics for the bank performance. During the sample period, the average *ROA* and *ROE* are 0.01 and 0.19, respectively, which is comparable to 0.01 and 0.14 in Liang et al. (2013), who study a sample of 52 Chinese banks during the period from 2003 to 2010. The average *Z-score* value is 3.88. On average, *NPLratio* is 0.01, which is smaller compared to 0.03 in Dong et al. (2014) for a sample of Chinese commercial banks during 2003-2011.

Board Age Diversity is measured by the coefficient of variation of age (*CV*) calculated by the ratio of the standard deviation of board age to mean of board age.[11]

<Insert Figure 2.1 about here>

Figure 2.1 and Panel B of Table 2.1 show substantial board age diversity in Chinese banks. Our sample shows that most of the directors in Chinese banks are aged from 35 to 70, and therefore grew up in Mao Zedong's or Deng Xiaoping's era. The average age of directors in Chinese banks is 51.95, and the standard deviation is high at 7.99. The youngest is 29 years old, while the oldest is 83. The average coefficient of variation of board age (*CV*) is 0.14. The majority of directors on Chinese boards appear to be in their forties (39%)

[10] That is the probability (–ROA < E/A), where E/A is the capital to assets ratio (equity/assets).

[11] Alternative measures of age diversity are the Blau Index (*Blau*) and log of the standard deviation of board age (*LnSD*). In our study, these three measures (*CV, Blau* and *LnSD*) are significantly correlated at 0.7 or above.

and fifties (39%).

X is a vector of control variables that includes four categories. First, variables on board characteristics include the natural logarithm of board size (*Board Size*), which is found to have a significant effect on bank performance (Adams and Mehran, 2012; Staikouras et al., 2007), the percentage of independent directors (*Independent Directors*) who may have strong incentives to scrutinize the management (Adam and Mehran, 2012; Erkens et al., 2012), and a dummy variable (*Duality*) that equals one if the chief executive officer (CEO) is also the chairman. As for the board diversity, previous studies suggest that the gender and nationality diversities both pose significant effects on firm performance (García-Meca et al., 2015; Liu et al., 2014; Sila et al., 2016), so the percentage of foreign directors (*Foreign Directors*) and the percentage of female directors (*Female Directors*) are also controlled in our study.

Second, the ownership variables control for both the type and level of the ownership structure (Liang et al., 2013). We include the proportion of shares owned by the largest shareholder if the largest shareholder is the government or state-owned enterprises (*State*), a foreign investor (*Foreign*), or a private investor (*Private*).

Some additional variables to capture bank-specific characteristics (Berger et al., 2009; Dong et al., 2014; García-Meca et al., 2015; Liang et al., 2013; Lin and Zhang, 2009) are also included. Bank size is measured by the natural logarithm of total assets (*Size*). The capital ratio is measured as total equity to total assets (*Capital Ratio*), reflecting the bank capitalization. We also calculate the loan ratio as total loans to total assets (*Loan Ratio*), which is related to the banks' credit. A dummy variable for listed banks (*Listed*) is equal to one if the bank is listed. We also include the natural logarithm of the number of years since the bank has been established (*Bank Age*) as banks with a long history tend to have a more mature operation system that is related to better performance.

Lastly, to account for the potential regional effects on bank performance, we follow previous studies (Ferri, 2009; Qian et al., 2015; Zhang et al., 2012) and employ the natural logarithm of GDP per capita for the city (*City GDP*) where the bank's headquarters are located. To control for macroeconomic shocks, all of our regressions contain a full set of year dummies.

Panel D of Table 2.1 reports the summary statistics for the control variables. The average board size in Chinese banks is 13.77, which is comparable to that of 12.68 in the US (Pathan and Faff, 2013) and 12.79 in nine developed countries (García-Meca et al., 2015).[12] On average, 25.00% of directors in Chinese banks are independent directors. In our sample, only 4.00% of CEOs in Chinese banks have the duality position. In the ongoing process of privatization, only about 18.00% of the sample banks are listed on the stock exchange. On average, in our sample, around 18.00% of shares are owned by the largest shareholder if the largest shareholder is the government or a state-owned enterprise.

A correlation matrix of main variables used in Model (1) is presented in Table 2.2. Based on previous study (e.g., Liu et al., 2014), a correlation of 0.7 or higher in its absolute value indicates a multicollinearity issue. Table 2.2 shows that the highest correlation coefficient is 0.675 between ROA and ROE. Since these two variables are alternative measures for bank performance and are not used simultaneously in one model, the high correlation is not an issue. With respect to other variables, there is no evidence for multicollinearity.

<Insert Table 2.2 about here>

[12] Nine developed countries include Canada, France, Germany, Italy, the Netherlands, Spain, Sweden, the UK and the US.

2.5.2.2 Board value diversity

In order to explore the reasons why board age diversity affects bank performance, we introduce directors' personal values. As discussed before, directors' values are not directly observable but are assumed to be framed by their ages. To obtain the impact of value diversity on bank performance, we take four steps.

First, we extract 17 value indicators that are related with work and business from the China Values Survey (2012), namely, risk, work, happiness, prudence, wealth, success, thoroughness, pressure, outgoing, active, creativity, helping others, finding faults, reserved, life satisfaction, slackness, and tension.[13] Following Ahern et al. (2015), we rescale the responses to each question (each value indicator) into a binary variable, taking values of zero or one (See Appendix 2.1). For example, for the value on risk, we assess whether the person is risk-taking by scaling answers "Very Much Like Me" and "Like Me" to be one and "Somewhat Like Me", "A Little Like Me", and "Not At All Like Me" to be zero.

Second, we apply a logit model to predict the parameters of each value specification based on the World Values Survey (China 2012). We follow previous economic and psychological literature on individuals' values and attitudes (e.g., Clark and Oswald, 1994; Dolan et al., 2008; Frey and Stutzer, 2000; Shields et al., 2009) and include available key demographic and socio-economic variables taken from the background information provided in the survey, including *Age*, *Gender, Education, Employment,* and *Income*.

The World Values Survey (China 2012) consists of the whole population of Chinese respondents, while our sample is only comprised of bank directors. *Income* and

[13] World Values Survey measures attitudes toward the environment, work, family, politics, national identity, culture, diversity, insecurity, and subjective well-beings. In the China Values Survey (2012), we focus on all value indicators that are related with work/business.

Employment reveal the differences between directors in our sample and the individuals in the survey.[14] Thus, we restrict the World Values Survey (China 2012) to a group of individuals who are employed at a high-income level. We employ propensity score matching analysis (See Appendix 2.2) to identify individuals in this group who have similar characteristics with bank directors in this restricted group.[15] Next, we predict the parameters of value specifications based on this subgroup of matched individuals.

The following logit model is used to predict personal values:

$$\Pr(value_{ij} = 1) = F\,(\beta_0 + \beta_1 Age_j + \beta_2 Education_j + \beta_3 Gender_j + \varepsilon) \qquad (2)$$

F is the cumulative standard logistic distribution. $value_{ij}$ equals one if the respondent j's response to the question (value indicator i) is recorded as one. ε denotes the random error, and the values are all measured by the probability of holding this value. Independent variables in Model (2) include *Age, Education,* and *Gender*. *Age* is given in years. *Education* is specified as categorical variables and is divided into three groups: *university* (university or higher), *second school* (specialized secondary or vocational technical school), and *primary school* (primary school or less). *Gender* is indicated as one for males and zero for females.

After the estimation, we identify the value indicators that are significantly affected by age shown by β_1 and keep them for later analysis. It results in keeping only six out of seventeen value indicators, namely, risk, prudence, wealth, success, creativity, and slackness (see Panel B of Appendix B).

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[14] In the World Values Survey, individuals' income level is scaled across nine levels (1-9). We rescale them into three categories: low (1-3), middle (4-6) and high (7-9). Income is consolidated from nine categories into three categories: high (7-9), middle (4-6), and low (1-3). Employment is denoted as one for those in employment and zero otherwise. In our study, we assume all directors are employed and belong to the high-income level.

[15] We present the detailed steps of propensity score matching in Appendix A2. Matching balance checking is also reported in Table A2. Additionally, the differences in means of variables between the treated and control groups are not significant, and the percentage of reduced bias for all the covariates is less than 5%.

Third, we input bank directors' information in our sample including age, education level, and gender into model (2) with the estimated parameters in the second step to predict six value indicators (risk, prudence, wealth, success, creativity, and slackness). Since some foreign directors have stayed in China for a long time, they are likely to be influenced by the Chinese culture and lifestyle. Then, we predict the values of the foreign directors, which account for less than 2% in our whole sample, using the World Values Survey (China 2012), as they are more likely to absorb the Chinese culture.[16]

In the last step, we employ the following model, which is similar to Model (1), to examine the impacts of these value diversities on bank performance:

$$Bank\ Performance_{i,t} = \alpha + \beta\ Board\ Value\ Diversity_{i,t-1} + X_{i,t-1}\delta + \theta_t + \mu_i + \varepsilon_{i,t} \quad (3)$$

$Board\ Value\ Diversity$ includes six value diversities that are calculated by the coefficient of variation of each value indicator. From Panel C of Table 2.1, we find that values on risk, wealth, and slackness have higher coefficients of variation (0.09, 0.12, 0.37, respectively) compared with the rest of the value indicators. Furthermore, if the β in Model (3) is in the same sign (positive or negative) as β in Model (1), we can then conclude that age is one of the strongest predictors of value, and age diversity can affect bank performance via the variations in directors' values.

2.6 Empirical results

2.6.1 Does age diversity affect bank performance?

We first examine whether the age diversity affects bank performance. Table 2.2 shows the results of Model (1) with bank profitability and bank risk presented in columns (1) - (2) and (3) - (4), respectively. Consistent with H1b, age diversity has a significant and

[16] In the robustness test, we predict directors' values partially based on their own countries' value survey.

negative impact on bank profitability. Specifically, a two-standard-deviation increase in age diversity (*CV*) shrinks *ROA* by 12.80% and *ROE* by 12.75%, which is comparable with Hagendorff and Keasey's (2012) study on banks and the strand of literature in non-bank samples (Ali et al., 2014; Murray, 1989; Tarus and Aime, 2014).

The results are in line with the argument based on social psychology theories that age diversity lessens the cohesion in the boardroom and leads to barriers such as difficult communications, and generates conflicts (Pelled et al., 1999; Westphal and Bednar, 2005; Williams and O'Reilly, 1996). Such conflicts can protract the decision-making process and weaken the effectiveness of the board. When the effects of conflicts in board communication, cooperation, and decision-making processes outweigh the benefits of providing comprehensive perspectives and different external information by directors at different ages, the role of the board as a monitor and advisor will be impeded. As a result, an insufficient board may subsequently weaken the bank's profitability. However, in terms of risk, we do not find any significant relationship between age diversity and bank risk.

<Insert Table 2.3 about here>

With respect to other board characteristics, *Duality* has a significantly negative relationship with *ROA* (significance at the 10% level) and a strong positive impact on *NPLratio* (significance at the 5% level), which indicates that banks with a CEO duality position perform worse. In terms of board independence, the coefficient of *Independent Directors* is significantly positive on bank profitability and negative on bank credit risk, which is consistent with previous studies (García-Meca et al., 2015; Liang et al., 2013). This relationship suggests that independent directors are beneficial to Chinese banks. We also notice that foreign directors have a negative influence on bank performance. It might be because foreign directors are less familiar with Chinese governance system, regulations, management culture, making it more difficult for them to evaluate the

managerial performance or challenge the managerial decisions and lead to negative firm outcomes (García-Meca et al., 2015 and Masulis et al., 2012). With regard to other bank characteristics, larger *Bank Size* weakens bank performance by decreasing *ROE* and augmenting non-performing loans. *Private* ownership harms bank performance measured by *ROA*. This might be because Chinese bureaucrats devote more efforts into the firms with a large portion of state shares than those with a large portion of private shares. These state firms, in turn, receive political supports and preferential treatments from the government and gain better access to resources, authorities and business connections. Given these facts in China, private firms perform worse than state firms (Sun et al., 2000, Tian and Estrin, 2008 and Yu, 2013). We also find that bank's *Capital Ratio* is negatively related with *ROE* and positively related with *Z-score* (both at the significance level of 1%), indicating that banks with a higher degree of capitalization have lower insolvency risk.

2.6.2 Age and values

Generational gaps are often caused by differences in values (Prasad, 1992). It appears that there is no consensus about how to define generations in China. Studies generally reach an agreement that each generation comes into existence with a particular social movement with a shared experience (Sun and Wang, 2010) and that most of an individual's values become entrenched in one's late-teens (Ralston et al., 1999). Based on this framework of value formation, in our study, we define our generation as two main groups that correspond to specific social and political events at the age of 18: Mao's generation (born during 1931-1958) and Deng's generation (born during 1959-1990) (See Figure 2.2).

According to some specific social events, we further divide the Mao generation into the early Mao generation (born during 1931-1947) who experienced the Communist Consolidation period and the late Mao generation (born during 1948-1958) who underwent the Great Cultural Revolution. Similarly, we decompose the Deng generation into the early Deng generation (born during 1959-1974) who experienced the Social

Economic Reform and the late Deng generation (born during 1975-1990) who are in the societal transition period (Egri and Ralston, 2004; Ralston et al., 1999; Sun and Wang, 2010).

<Insert Figure 2.2 about here>

Our value analysis first focuses on the logit regression of 17 value indicators based on the matched subgroup in the World Values Survey (China 2012). Table 2.4 shows the predicted parameters of different values. Six value indicators (i.e., risk, prudence, wealth, success, creativity, slackness) are significantly affected by age.

<Insert Table 2.4 about here>

<Insert Figure 2.3 about here>

Figure 2.3 shows the changes of these six values (average probability of holding this value) among directors in our sample. Our results confirm the previous argument that individuals' values change across age cohorts in China (Egri and Ralston, 2004; Sun and Wang, 2010). More specifically, directors' values on risk, prudence, and wealth vary widely across generations. Compared to directors from the early Mao generation, directors from the late Deng generation are more creative, have greater risk appetite, appreciate wealth more, and pursue profit maximization, which is consistent with previous propositions by Huang et al. (2015) and Sun and Wang (2010). In terms of work ethics, younger directors born in the late Deng generation in China enjoy the feeling of being successful and yearn for achievement recognition, but they are less prudent and cautious than the older ones.

2.6.3 Why does age diversity affect bank performance?

In order to further investigate the negative relationship between age diversity and bank performance, we decompose age diversity into value diversity and test whether diversity in different values influences bank performance. Similar to age diversity, the results presented in Table 2.5 show that the heterogeneity of directors' views in some cases poses

a negative impact on bank profitability, which supports H2b.

<Insert Table 2.5 about here>

The coefficients of directors' diverse views on risk, prudence, and wealth impose negative impacts on bank profitability,[17] while variations in directors' values on creativity and slackness do not affect bank profitability. An increase of two standard deviations in value diversity on risk is associated with a decrease in *ROA* of 16.80% and in *ROE* of 18.44%. With regard to prudence, increases of two standard deviations exert negative impacts on *ROA* and *ROE* of 20.40% and 19.68%, respectively. Furthermore, increases of two standard deviations in directors' value diversity of wealth reduce banks' *ROA* by 15.20% and *ROE* by 16.71%. Additionally, we observe that the coefficients of directors' diverse values on success affect *ROE* negatively at the 5% level. These results suggest that value diversity can trigger intragroup conflicts in the workforce and cause a negative impact on performance.

As shown in Figure 2.3, directors' values change with different levels across the four generations of Chinese bank directors. Compared with older directors, those bank directors growing up in Deng's era have a greater appetite of risk and pursue profit maximization. We also find that directors growing up in Mao's era are more cautious and they value wealth less. Taken together, the differences in directors' personal values on risk, prudence, and wealth across generations are more likely to weaken the interpersonal relations between groups and may spark intragroup conflicts in the decision making process. As a result, this conflict prevents the board from functioning effectively, which ultimately harms bank performance. In summary, taking together the results shown in Tables 2.3, 2.4, and 2.5, the effect of value diversity has the same sign with that of age diversity on bank profitability. Thus, we conclude that age diversity may affect bank

[17] As directors' values are imputed, we have also modified our approach by using bootstrapped standard errors. The results are reported in Appendix C5; they are quantitatively similar to the estimates in Table 4.

profitability negatively via their diverse values.

With respect to bank risk, Table 2.5 illustrates that directors' diverse values fail to have any significant effects on the *Z-score* or *NPLratio*, indicating that the variability of directors' views is unrelated with bank risk.

2.7 Robustness

2.7.1 Potential endogeneity concern

A key concern for analyses of board effects on firm performance is the endogeneity (Hermalin and Weisbach, 2003). The relationship between board age diversity and performance may be biased because of the possible correlation between independent variables and the error term. On one side, board age diversity generates conflicts among the directors and harms bank performance; on the other side, banks that perform worse may appoint an older director who is more experienced, which may change the board age diversity. We partially address this reverse causality issue by employing one-year lagged board characteristics in our previous analysis.

In this section, we employ a fixed effect instrumental variable approach using Lewbel's (2012) method, which includes internal and external instrumental variables. Following previous studies (e.g., Anderson et al., 2011; Liu et al., 2014), board diversity in a firm may be affected by the diversity in the same industry (size) or the diversity of local population. Therefore, our external instrumental variables are the median value of board age diversity for the banks in the same size quartile (*Age Diversity Size*)[18] and the age

[18] Previous studies usually use the median value of board diversity for the firm in the same industry and the same size quantile as the firm. However, our study only focuses on one industry (banking), so we use the median value of board age diversity for the banks in the same size group. When calculating *Age Diversity Size*, we exclude that specific bank and only focus on the other banks in the same size group.

diversity of the local population at the province level (*Age Diversity Province*).[19] The economic rationale for using local population age diversity is that directors typically come from a firm's local geographic area and that greater local population age diversity provides a larger and more age-diverse pool to source directors.

<Insert Table 2.6 about here>

Table 2.6 presents the results from estimating the fixed effect Model (1) using the instrumental variable approach. In the first column, the coefficients on two instruments, Age Diversity Size and Age Diversity Province are positive and significant in the first stage regression. This finding shows that the instrument variables are relevant. F-statistic also provides additional support for the joint relevance of all instruments. In the rest columns, the LR statistics and Hansen J statistics both show that our external instruments satisfy the relevance and validity criterion in all specifications. Table 2.6 reports consistent findings with Table 2.3. In the first two specifications of bank profitability, the coefficients of the board age diversity are negative and significant, which indicates that our main results in Model (1) are robust.

In board composition research, dynamic endogeneity is also a major issue. Wintoki et al. (2012) argue that most of the existing studies on board structure neglect the fact that current board structure might be an outcome of past firm performance. Current firm performance may affect future board composition, and these, in turn, may affect future firm performance. In our study, shareholders may call for changes to the board. Replacing a younger director with an older one could change the age distribution on the board and, ultimately, affect bank performance. Thus, previous bank performance can affect the motivation of boards to hire new directors.

[19] We calculate the age diversity of the local population at the province level where the headquarter of the bank is located. Additionally, the provincial level data are collected from the *China Statistical Yearbook.*

As a possible solution, following previous studies (Goergen et al., 2015; Liu et al., 2014; Wintoki et al., 2012), our empirical analysis is extended to employ the Arellano-Bond (1991) dynamic Generalized Method of Moments (GMM) estimator in Model (4), which accounts for unobserved heterogeneity as well as the dynamic relation between board structure and past firm performance.

$$Bank\ Performance_{i,t} = \alpha + \gamma Bank\ Performance_{i,t-1} + \beta Board\ Age\ Diversity_{i,t} + X_{i,t}\delta + \theta_t + \mu_i + \varepsilon_{i,t} \quad (4)$$

All of the independent variables are assumed to be endogenous variables, except for the year dummies. The lags (t-3 and t-4) of dependent variables and endogenous variables, together with all of the lags of the exogenous variables, are instrumental variables. In Table 2.7, we still find significant negative effects (at the 5% level) of board age diversity on bank profitability. Therefore, our main results in Model (1) are robust and are not driven by endogeneity.

<Insert Table 2.7 about here>

2.7.2 Additional robustness tests

When examining the relationship between age diversity and bank performance in Model (1), we use the log of the standard deviation of board age (*LnSD*) and the Blau index of board age diversity (*Blau*) as alternative measures of age diversity. We find a consistently negative relation between age diversity and bank profitability (shown in Appendix 2.4 and 2.5). Additionally, we also followed existing studies (Bonin et al., 2005; Liang et al., 2013) to use *Net Interest Margin* and *Pre-Provision Profit Ratio* as alternative measures of bank profitability. We obtain a negative effect of age diversity on bank profitability, which is consistent with previous findings (See Appendix 2.6).

Further, we conduct an alternative approach to predict directors' values. We construct a restricted group of individuals (employed and high income) in the World Values Survey (China 2012) and then conduct the propensity score matching analysis. As a robust test,

we predict directors' values only based on this restricted group rather than the subgroup of matched individuals. Additionally, some may argue that foreign directors' values are affected not only by their own country but also by China. Thus, we calculate foreign directors' values based on the China survey and their own country survey with equal weights as a robustness check in Appendix 2.7. The results are similar to our previous findings in Table 2.4.

We also find negative relations between directors' value diversities on risk, prudence, wealth, and success at one side and bank profitability at the other side. By focusing on a different subgroup (i.e., those employed and with high income), we also find that directors' diverse views with respect to slackness has a negative effect on *ROA*. The results confirm the results from our previous analysis that directors' value diversities have a negative impact on bank profitability.

2.8 Conclusion

This paper extends the existing literature on board diversity by providing the first empirical evidence regarding the effect of board age diversity on bank performance in China. Our results show that age diversity in Chinese banks has a significant and negative influence on bank profitability. Although previous studies based on resource dependence theory argue that a more diverse board provides more external resources and enhances firm performance, our study suggests that age diversity is not beneficial to Chinese banks. That is, age-diverse boards are more likely to suffer from communication barriers and generate interpersonal frictions and conflicts in the boardroom; ultimately, they may harm bank performance.

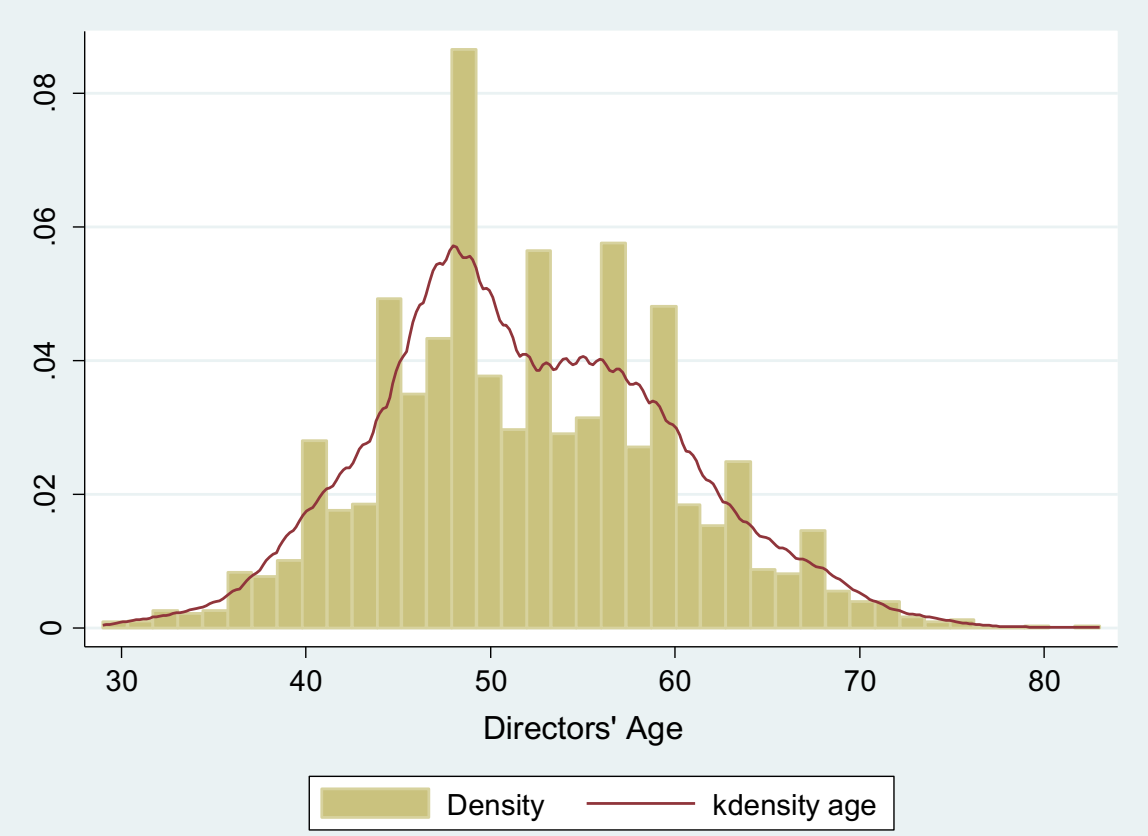
To examine why age diversity negatively affects bank performance, we further decompose directors' age diversity into their personal value diversities. Given the immense transition in China over the past decades, directors that grew up in Mao's and

Deng's eras experienced different historical events and cultural phenomena, which in turn affected their formulation of values and cognitive abilities. We find that the heterogeneity of directors' views with respect to risk, prudence, and wealth negatively affects bank profitability. In other words, directors with diverse values on risk, prudence and wealth may approach decisions differently (i.e., they are more likely to slow down the decision process in the boardroom and create more conflicts), leading to worse bank performance. Thus, we conclude that the ultimate success of the board depends not only directors' resources but also the interactions between them.

Our findings provide useful guidance for regulators, policymakers, and bank directors concerning board diversity and shed light on the direction of further banking governance reform. In particular, our findings suggest that, in the current weak corporate governance system in China, an age-diverse board is not beneficial for banks. Banks with weak governance should look into adding directors with similar ages into their board, to lower the generation gap.

We believe that findings from this study are relevant not only for China but also for other transition countries that are transforming from a centrally planned economy to a market-based economy. For these countries, directors from different generations are more likely to hold heterogeneous values, as cultural change is an ingredient of economic development. To strive for excellence, the board should appreciate the diverse personal values among directors, learn to manage value differences, and utilize the benefits of directors' different personal values to improve the effectiveness of the board. Managing the difference among directors is likely to lead to a better understanding of optimal board composition.

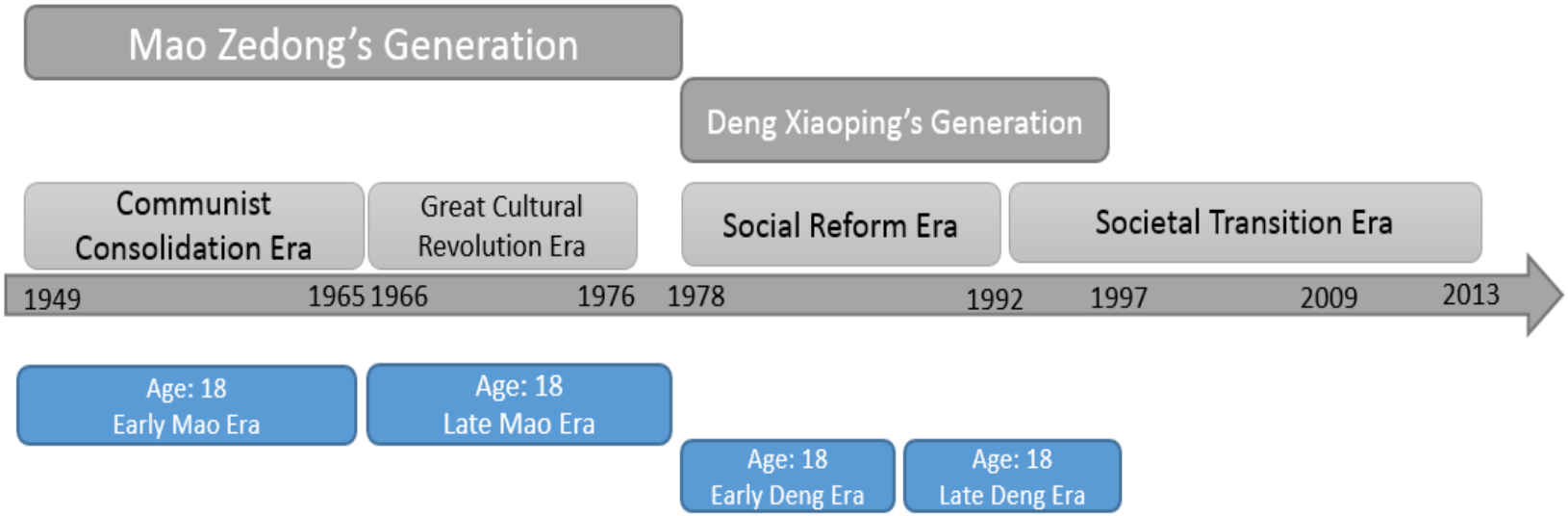
Figure 2.1 Distribution of Directors' Age in Chinese Banks from 2009-2013



Source: Chinese bank annual report (2009, 2010, 2011, 2012 and 2013)

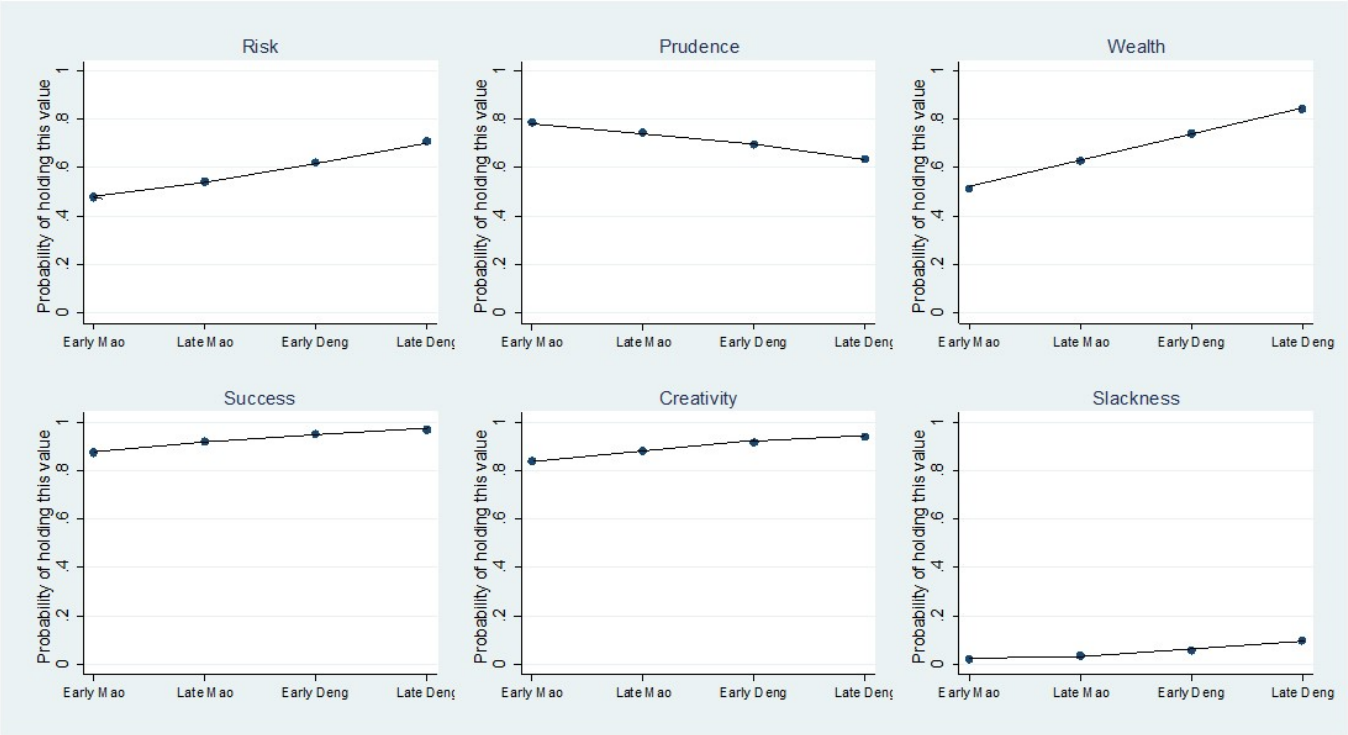
Notes: This figure reports the distribution of directors' age in Chinese banks.

Figure 2.2 Generation Timeline in China



Notes: This figure shows the generation timeline in China. Mao's era covers Communist Consolidation (1949-1965) and Great Cultural Revolution (1966-1976), while Deng Xiaoping initiated the Social Reform Era (1978-1992) and part of the Societal Transition Era(1993-now) (Egri and Ralston, 2004; Ralston et al., 1999; Sun and Wang, 2010). Since social events at the age of 18 are far more influential than those that occur at an older age (Ghitza and Gelman, 2014), we divided different sub-generations based on the age of 18.

Figure 2.3 Personal Value Differences Among Directors in Chinese Banks from 2009 – 2013



Source: Chinese bank annual report (2009, 2010, 2011, 2012, and 2013), World Values Survey 6th Wave

Notes: Panels A to H show directors' personal value (mean) changes across different age groups. We define our generation groups that correspond to specific social and political events at the age of 18: the early Mao generation (born during 1931-1947), the late Mao generation (born during 1948-1958), the early Deng generation (born during 1959-1974), and the late Deng generation (born during 1975-1990).

Table 2.1 Summary statistics

Variables	Mean	Std	P25	P50	P75	N
Panel A: Bank Performance						
ROA	0.01	0.00	0.01	0.01	0.01	448
ROE	0.19	0.07	0.15	0.18	0.22	448
Z-score	3.88	0.72	3.37	3.81	4.31	447
NPLratio	0.01	0.01	0.01	0.01	0.01	435
Net Interest Margin	0.02	0.02	0.02	0.03	0.03	433
Pre-Provision Profit Ratio	-0.01	0.00	-0.01	-0.01	-0.00	397
Panel B: Bank Board Age Diversity						
Age diversity (CV)	0.14	0.04	0.11	0.14	0.17	450
Age diversity (LnSD)	1.94	0.29	1.80	1.94	2.15	450
Age diversity (Blau)	0.58	0.11	0.52	0.60	0.65	450
Panel C: Bank Board Value Diversity						
Value diversity (risk)	0.09	0.03	0.07	0.09	0.11	302
Value diversity (prudence)	0.05	0.02	0.04	0.04	0.06	302
Value diversity (wealth)	0.12	0.04	0.09	0.11	0.14	302
Value diversity (success)	0.03	0.02	0.02	0.02	0.03	302
Value diversity (creativity)	0.03	0.02	0.02	0.03	0.04	302
Value diversity (slackness)	0.37	0.15	0.30	0.36	0.44	302
Panel D: Control Variables						
Board Characteristics						
Independent Directors	0.25	0.12	0.15	0.27	0.33	450
Board Size	13.77	3.37	11.00	14.00	15.00	450
Duality	0.04	0.19	0.00	0.00	0.00	450
Foreign Directors	0.02	0.05	0.00	0.00	0.00	450
Female Directors	0.11	0.10	0.00	0.09	0.17	450
Ownership Characteristics						
State	0.18	0.19	0.00	0.12	0.21	451
Foreign	0.02	0.06	0.00	0.00	0.00	451
Private	0.03	0.07	0.00	0.00	0.00	451
Bank-Specific Measures						
Capital Ratio	0.07	0.02	0.05	0.06	0.08	450
Loan Ratio	0.46	0.11	0.40	0.48	0.54	450
Size	18.81	1.67	17.70	18.44	19.55	450
Bank Age	2.50	0.77	1.95	2.64	2.83	450
Listed	0.18	0.39	0.00	0.00	0.00	451
Location Effects						
City GDP	10.98	0.50	10.63	11.07	11.38	454

Notes: This table reports descriptive statistics for main variables. The sample is an unbalanced panel covering 97 banks over the period from 2009 to 2013. Panel A reports the summary statistics of bank performance measures. Panel B reports the descriptive statistics for bank board age diversities. Panel C reports the summary statistics for board value diversities. Panel D reports the summary statistics for other control variables.

Table 2.2 Correlation matrix for main variables

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	ROA	1.000																				
2	ROE	**0.675**	1.000																			
3	Z-score	0.072	-0.035	1.000																		
4	NPLratio	**-0.284**	**-0.227**	**-0.156**	1.000																	
5	Age Diversity	**-0096**	**-0.171**	**0.208**	**-0.090**	1.000																
6	Board Size	-0.015	-0.011	**0.242**	-0.075	0.029	1.000															
7	Duality	-0.013	-0.039	0.030	0.015	-0.008	0.046	1.000														
8	Independent Directors	-0.020	-0.043	**0.310**	**-0.092**	**0.165**	**0.327**	-0.032	1.000													
9	Foreign Directors	**-0.114**	-0.010	**0.212**	-0.057	**-0.131**	**0.262**	-0.050	**0.198**	1.000												
10	Female Directors	0.029	0.024	0.033	-0.019	0.031	**0.203**	**0.065**	0.026	0.041	1.000											
11	State	**-0.228**	-0.114	**-0.199**	**-0.091**	-0.055	**-0.106**	-0.62	0.027	0.049	**0.104**	1.000										
12	Foreign	**-0.099**	-0.008	**0.210**	**0.170**	0.014	0.039	-0.062	**0.172**	**0.468**	-0.041	**-0.302**	1.000									
13	Private	0.069	0.060	0.015	-0.051	-0.002	0.061	-0.006	0.027	-0.031	-0.072	**-0.365**	-0.010	1.000								
14	Size	**-0.095**	0.096	**0.240**	-0.071	**-0.250**	**0.530**	-0.070	**0.386**	**0.369**	**0.142**	**0.255**	0.073	0.063	1.000							
15	Listed	-0.018	0.083	**0.243**	-0.060	**-0.242**	**0.459**	**-0.091**	**0.345**	**0.203**	0.063	**0.166**	-0.002	**0.125**	**0.475**	1.000						
16	Loan Ratio	**0.188**	-0.000	0.001	**0.159**	**-0.160**	**0.169**	-0.001	0.058	**0.100**	0.077	**-0.231**	**0.083**	**0.093**	0.040	**0.147**	1.000					
17	Capital Ratio	**0.180**	**-0.376**	**0.235**	-0.054	**0.180**	-0.035	0.027	0.078	**-0.150**	0.027	**-0.133**	**-0.100**	0.078	**-0.269**	**-0.145**	**0.097**	1.000				
18	City GDP	**-0.096**	**-0.156**	**0.198**	-0.017	-0.060	**0.241**	**-0.167**	**0.321**	**0.210**	0.023	**0.115**	**0.113**	**0.081**	**0.472**	**0.300**	**0.097**	**0.097**	1.000			
19	Bank Age	0.001	0.104	**0.095**	**0.120**	**-0.297**	**0.264**	0.059	**0.120**	**0.258**	0.045	**0.113**	**0.092**	0.026	**0.501**	**0.447**	**0.209**	**-0.194**	**0.256**	1.000		
20	Net Interest Margin	0.058	-0.035	-0.011	**0.024**	**-0.041**	**-0.064**	0.500	**-0.070**	**0.039**	-0.126	**-0.156**	**-0.055**	0.138	**-0.174**	**-0.092**	**0.055**	**0.089**	**-0.243**	0.018	1.0000	
21	Pre-provision Profit	-0.011	0.181	**-0.074**	**-0.075**	**-0.72**	**0.064**	0.043	**0.096**	**0.014**	0.016	**0.251**	**-0.068**	-0.019	**0.242**	**0.152**	**-0.314**	**-0.121**	**0.164**	0.267	-0.021	1.0000

Notes: This table shows the correlation matrix of main variables. *ROA* is net income to total assets. *ROE* is net income to total equity. *Z-score* is measured by the return on assets plus the equity to assets ratio divided by the standard deviation of the return on assets. *NPLratio* is non-performing loans divided by total loans. *Age Diversity* is measured by coefficient of variation of board age (*CV*). *Board Size* is the natural log of board size. The dummy variable *Duality* is equal to one if the bank governor is also the chairman of the board, and zero otherwise. *Independent Directors* is the percentage of independent directors. *Foreign Directors* is the percentage of foreign directors. *Female Directors* is the percentage of female directors. *State* is the percentage of shares held by the largest shareholders if the largest shareholder is the government or a state-owned enterprise. *Foreign* is the percentage of shares held by the largest shareholders if the largest shareholder is a foreign investor. *Private* is the percentage of shares held by the largest shareholders if the largest shareholder is a private investor. *Size* is the natural log of total assets. *Bank Age* is the natural log of bank's age. The dummy *Listed* equals to one if the bank is listed, and zero otherwise. *City GDP* is the natural log of GDP per capita of the city in which the bank's headquarters is located. *Net Interest Margin* is measured by net interest income divided by total earning assets. The *Pre-Provision Profit* ratio is calculated as the difference between operating income and operating expense to total assets.

Table 2.3 Relation between board age diversity and bank performance

	Profitability		Risk	
	ROA	ROE	Z-score	NPLratio
	(1)	(2)	(3)	(4)
Age Diversity	-0.016**	-0.303**	-0.092	0.037
	(0.007)	(0.129)	(0.449)	(0.037)
Board Size	0.000	0.001	-0.001	-0.000
	(0.000)	(0.001)	(0.003)	(0.000)
Duality	-0.002*	-0.021	0.096	0.005**
	(0.001)	(0.018)	(0.086)	(0.002)
Independent Directors	0.005*	0.078	0.268*	-0.028**
	(0.003)	(0.055)	(0.160)	(0.012)
Foreign Directors	-0.008*	-0.177**	0.630**	0.031*
	(0.004)	(0.079)	(0.309)	(0.018)
Female Directors	0.001	0.021	0.004	-0.002
	(0.002)	(0.058)	(0.143)	(0.008)
State	0.009	0.178	0.191	-0.041
	(0.006)	(0.114)	(0.340)	(0.039)
Foreign	-0.000	0.206	-0.222	0.008
	(0.008)	(0.151)	(0.467)	(0.034)
Private	-0.010**	-0.097	0.017	0.050*
	(0.004)	(0.080)	(0.303)	(0.029)
Size	-0.001	-0.043*	0.045	0.013*
	(0.001)	(0.024)	(0.080)	(0.007)
Listed	0.001	0.007	0.010	0.001
	(0.001)	(0.015)	(0.054)	(0.005)
Loan Ratio	-0.004	-0.080	-0.235	0.027
	(0.004)	(0.071)	(0.255)	(0.020)
Capital Ratio	0.010	-0.591***	2.719***	-0.010
	(0.010)	(0.195)	(0.651)	(0.039)
City GDP	-0.002	-0.024	-0.036	0.001
	(0.001)	(0.025)	(0.077)	(0.004)
Bank Age	-0.000	0.012	0.030	0.013**
	(0.002)	(0.030)	(0.080)	(0.007)
Year Controls	Yes	Yes	Yes	Yes
N	349	349	349	342
R^2	0.230	0.180	0.202	0.199

Notes: The table presents the regression results for the effects of age diversity on bank performance (bank profitability and risk). The result of bank profitability measured by *ROA* and *ROE* are presented in columns (1) and (2). The results of bank risk measured by *Z-score* and *NPLratio* are presented in columns (3) and (4). Age Diversity is measured by coefficient of variation of board age (*CV*). *Board Size* is the natural log of board size. The dummy variable *Duality* is equal to one if the bank governor is also the chairman of the board, and zero otherwise. *Independent Directors* is the percentage of independent directors. *Foreign Directors* is the percentage of foreign directors. *Female Directors* is the percentage of female directors. *State* is the percentage of shares held by the largest shareholders if the largest shareholder is the government or a state-owned enterprise. *Foreign* is the percentage of shares held by the largest shareholders if the largest shareholder is a foreign investor. *Private* is the percentage of shares held by the largest shareholders if the largest shareholder is a private investor. *Size* is the natural log of total assets. *Bank Age* is the natural log of bank's age. The dummy *Listed* equals one if the bank is listed, and zero otherwise. *City GDP* is the natural log of GDP per capita of the city in which the bank's headquarters is located. It employs the panel fixed effect estimator with lagged independent variables. Constant is included into the estimation but not reported. The robust error of each coefficient is shown in parentheses. *, **, *** indicate statistical significance level at 10%, 5%, and 1%, respectively.

Table 2.4 Regression of prediction of values (China)

Panel A	Value (risk)	Value (work)	Value (happiness)	Value (prudence)	Value (wealth)	Value (success)	Value (thoroughness)	Value (pressure)	
Age	-0.030***	-0.029	0.032	0.022*	-0.051***	-0.043**	-0.014	-0.011	
	(0.011)	(0.021)	(0.020)	(0.012)	(0.015)	(0.018)	(0.014)	(0.012)	
Education									
2(secondary school)	0.130	0.711	0.542	0.007	-0.211	-0.075	0.185	0.106	
	(0.315)	(0.492)	(0.582)	(0.385)	(0.419)	(0.482)	(0.383)	(0.364)	
3(university)	0.293	0.466	1.267*	-0.516	-0.772*	0.923	0.957**	0.015	
	(0.355)	(0.522)	(0.667)	(0.399)	(0.453)	(0.698)	(0.432)	(0.398)	
Gender	0.065	0.365	-0.543	0.007	0.253	-0.212	0.002	0.156	
	(0.222)	(0.363)	(0.423)	(0.245)	(0.286)	(0.395)	(0.271)	(0.235)	
N	374	389	393	373	375	375	320	319	
R^2	0.029	0.034	0.018	0.025	0.048	0.045	0.030	0.004	
Panel B	Value (active)	Value (creativity)	Value (helping other)	Value (finding faults)	Value (reserved)	Value (life satisfaction)	Value (slackness)	Value (nervous)	Value (outgoing)
Age	-0.015	-0.033**	-0.038	0.000	-0.010	-0.002	-0.050**	-0.010	-0.018
	(0.012)	(0.015)	(0.037)	(0.013)	(0.013)	(0.012)	(0.021)	(0.014)	(0.012)
Education									
2(secondary school)	0.098	0.325	0.506	0.820*	0.495	-0.341	-0.989**	-0.372	0.482
	(0.368)	(0.374)	(0.917)	(0.427)	(0.386)	(0.366)	(0.494)	(0.376)	(0.361)
3(university)	0.748*	1.141**	0.000	0.853*	0.767*	0.179	-1.760***	-0.541	0.402
	(0.403)	(0.502)	(0.000)	(0.458)	(0.422)	(0.404)	(0.583)	(0.419)	(0.397)
Gender	0.274	0.345	0.832	0.319	-0.515**	-0.094	0.508	-0.232	0.245
	(0.239)	(0.293)	(0.843)	(0.250)	(0.240)	(0.243)	(0.377)	(0.254)	(0.236)
N	308	375	259	311	314	390	328	318	321
R^2	0.030	0.065	0.056	0.018	0.023	0.009	0.054	0.008	0.024

Notes: This table presents the results of prediction of seventeen values drawn from the World Values Survey (China). *Age* is given in years. *Education* is specified as categorical variables, divided into three groups: university (university or higher), second school (specialized secondary or vocational technical school), and primary school (primary school or less). *Gender* is indicated as zero for females and one for males. It employs a logit model with robust standard errors. Constant is included into the estimation but not reported. The robust error of each coefficient is shown in parentheses. *, **, *** indicate statistical significance level at 10%, 5%, and 1%, respectively.

Table 2.5 Relation between board value diversity and bank performance

	Value diversity (risk)	Value diversity (prudence)	Value diversity (wealth)	Value diversity (success)	Value diversity (creativity)	Value diversity (slackness)
Panel A: Dependent variable is ROA						
ROA	-0.028**	-0.051**	-0.019**	-0.051	-0.029	-0.003
	(0.013)	(0.024)	(0.009)	(0.033)	(0.025)	(0.002)
Year Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	239	239	239	239	239	239
R^2	0.307	0.302	0.302	0.290	0.280	0.279
Panel B: Dependent variable is ROE						
ROE	-0.584**	-0.935**	-0.397**	-1.224**	-0.798	-0.092
	(0.251)	(0.463)	(0.185)	(0.610)	(0.603)	(0.057)
Year Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	239	239	239	239	239	239
R^2	0.303	0.290	0.296	0.289	0.276	0.278
PanelC: Dependent variable is Z-score						
Z-score	-0.312	-0.022	-0.283	0.419	-0.459	0.057
	(0.874)	(1.630)	(0.672)	(1.678)	(2.123)	(0.209)
Year Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	239	239	239	239	239	239
R^2	0.176	0.175	0.177	0.176	0.176	0.176
Panel D: Dependent variable is NPLratio						
NPLratio	-0.312	-0.022	-0.283	0.419	-0.459	0.057
	(0.874)	(1.630)	(0.672)	(1.678)	(2.123)	(0.209)
Year Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	239	239	239	239	239	239
R^2	0.176	0.175	0.177	0.176	0.176	0.176

Notes: This table presents the results for the effects of value diversity on bank performance. Panel A presents results for regressing ROA on various value diversities. Panel B presents results for regressing *ROE* on various value diversities. Panel C presents results for regressing *Z-score* on various value diversities. Panel D presents results for regressing *NPLratio* on various value diversities. For the sake of saving space, the estimation results for control variables are omitted here. Constant is included into the estimation but not reported. The robust error of each coefficient is shown in parentheses. *, **, *** indicate statistical significance level at 10%, 5%, and 1%, respectively.

Table 2.6 Fixed effect instrumental variable approach: relation between board age diversity and bank performance

	First Stage	Second Stage			
	Age Diversity	Profitability		Risk	
		ROA	ROE	Z-score	NPLratio
	(1)	(2)	(3)	(4)	(5)
Age Diversity Size	0.319*				
	(0.163)				
Age Diversity Province	0.024*				
	(0.048)				
Age diversity		-0.039**	-0.474*	0.407	0.106
		(0.018)	(0.286)	(1.056)	(0.089)
Board Size	0.003***	0.000**	0.001	-0.001	-0.000
	(0.001)	(0.000)	(0.001)	(0.004)	(0.000)
Duality	-0.012	-0.003**	-0.023	0.091	0.005**
	(0.009)	(0.001)	(0.016)	(0.078)	(0.002)
Independent Directors	0.097***	0.006***	0.074*	0.316*	-0.029**
	(0.018)	(0.002)	(0.044)	(0.161)	(0.012)
Foreign Directors	-0.066*	-0.012**	-0.206**	0.637*	0.043*
	(0.037)	(0.006)	(0.082)	(0.375)	(0.025)
Female Directors	0.025	0.001	0.032	-0.000	-0.003
	(0.019)	(0.002)	(0.049)	(0.160)	(0.010)
State	0.008	0.007	0.161	0.117	-0.037
	(0.013)	(0.005)	(0.113)	(0.396)	(0.032)
Foreign	0.030	-0.002	0.197	-0.295	0.012
	(0.043)	(0.008)	(0.143)	(0.492)	(0.033)
Private	0.037	-0.011**	-0.097	0.003	0.053**
	(0.032)	(0.005)	(0.091)	(0.314)	(0.025)
Size	-0.007***	-0.001	-0.042**	-0.008	0.014***
	(0.002)	(0.001)	(0.019)	(0.077)	(0.005)
Listed	-0.018***	-0.000	0.004	0.008	0.003
	(0.007)	(0.001)	(0.018)	(0.073)	(0.005)
Loan Ratio	-0.071***	-0.005*	-0.063	-0.275	0.029*
	(0.020)	(0.003)	(0.058)	(0.260)	(0.017)
Capital Ratio	0.235**	0.010	-0.805***	1.752**	-0.007
	(0.103)	(0.011)	(0.225)	(0.866)	(0.045)
City GDP	0.003	-0.001	-0.023	-0.025	-0.000
	(0.005)	(0.001)	(0.023)	(0.082)	(0.004)
Bank Age	-0.004	-0.000	0.014	-0.028	0.013**
	(0.003)	(0.001)	(0.023)	(0.084)	(0.006)
Year Controls	Yes	Yes	Yes	Yes	Yes
N	345	345	345	345	340
F-statistics	15.24				
LM		0.000	0.000	0.000	0.000
Hansen		0.536	0.506	0.516	0.877

Notes: This table presents the results of the fixed effect instrumental variable estimation using Lewbel's (2012) method. The results of first stage regression in reported in column (1). The result of bank profitability measured by *ROA* and *ROE* are presented in columns (2) and (3). The results of bank risk measured by *Z-score* and *NPLratio* are presented in columns (4) and (5). *Age Diversity* is measured by coefficient of variation of board age (*CV*). *Age Diversity Size* and

Age Diversity Province are two instrument variables of *Age Diversity*. *Board Size* is the natural log of board size. The dummy variable *Duality* is equal to one if the bank governor is also the chairman of the board, and zero otherwise. *Independent Directors* is the percentage of independent directors. *Foreign Directors* is the percentage of foreign directors. *Female Directors* is the percentage of female directors. *State* is the percentage of shares held by the largest shareholders if the largest shareholder is the government or a state-owned enterprise. *Foreign* is the percentage of shares held by the largest shareholders if the largest shareholder is a foreign investor. *Private* is the percentage of shares held by the largest shareholders if the largest shareholder is a private investor. *Size* is the natural log of total assets. *Bank Age* is the natural log of bank's age. The dummy *Listed* equals one if the bank is listed, and zero otherwise. *City GDP* is the natural log of GDP per capita of the city in which the bank's headquarters is located. The external instrumental variables are the median value of board age diversity for the bank in the same size quartile and the age diversity of the local population at the province level. LR statistics is the test for under-identification. Hansen test statistics is the test of over-identifying restrictions based on the null that instruments are valid. Constant is included into the estimation but not reported. The robust error of each coefficient is shown in parentheses. *, **, *** indicate statistical significance level at 10%, 5% and 1%, respectively.

Table 2.7 System GMM estimations: relation between board age diversity and bank performance

	Profitability		Risk	
	ROA	ROE	Z-score	NPLratio
	(1)	(2)	(3)	(4)
Lagged ROA	0.726***			
	(0.174)			
Lagged ROE		0.840***		
		(0.172)		
Lagged Z-score			0.901***	
			(0.101)	
Lagged NPLratio				0.330**
				(0.142)
Age diversity	-0.037	-0.726**	0.582	0.059
	(0.028)	(0.366)	(1.720)	(0.095)
Board Size	0.000	0.002	-0.003	-0.001
	(0.000)	(0.005)	(0.018)	(0.001)
Duality	0.000	0.033	0.040	-0.013
	(0.006)	(0.086)	(0.285)	(0.033)
Independent Directors	0.003	-0.047	-0.027	-0.040*
	(0.010)	(0.111)	(0.540)	(0.024)
Foreign Directors	0.006	0.043	0.015	-0.016
	(0.005)	(0.067)	(0.365)	(0.019)
Female Directors	0.015	0.213	0.314	0.044
	(0.017)	(0.373)	(1.169)	(0.097)
State	0.027*	0.285	1.329	-0.083*
	(0.015)	(0.226)	(1.197)	(0.043)
Foreign	0.005	0.056	0.497*	0.001
	(0.005)	(0.077)	(0.279)	(0.031)
Private	0.000	-0.004	0.153*	0.004
	(0.001)	(0.012)	(0.082)	(0.003)
Size	0.000	0.013	-0.141	-0.007
	(0.003)	(0.027)	(0.182)	(0.014)
Listed	-0.001	0.003	0.025	-0.002
	(0.006)	(0.074)	(0.380)	(0.018)
Loan Ratio	0.001	0.136	-0.118	0.002
	(0.006)	(0.088)	(0.314)	(0.019)
Capital Ratio	0.016	-1.525	5.630	0.133
	(0.076)	(0.999)	(4.839)	(0.178)
City GDP	-0.003	-0.025	-0.234	-0.001
	(0.003)	(0.036)	(0.164)	(0.009)
Bank Age	-0.002*	-0.038*	-0.127	0.000
	(0.001)	(0.022)	(0.081)	(0.003)
Year Control	Yes	Yes	Yes	Yes
N	347	347	347	341
AR2 p-value	0.482	0.198	0.903	0.543
Hansen p-value	0.488	0.970	0.859	0.998

Notes: This table presents the results of the two-step system GMM estimation. The results of bank profitability measured by *ROA* and *ROE* are presented in columns (1) and (2). The results of bank risk measured by *Z-score* and *NPLratio* are presented in columns (3) and (4). *Age Diversity* is measured by coefficient of variation of board age (*CV*). *Board Size* is the natural log of board size. The dummy variable *Duality* is equal to one if the bank governor is also the chairman of the board, and zero otherwise. *Independent Directors* is the percentage of independent directors. *Foreign Directors* is the percentage of foreign directors. *Female Directors* is the percentage of female directors. *State* is the percentage of shares held by the largest shareholders if the largest shareholder is the government or a state-owned enterprise. *Foreign* is the percentage of shares held by the largest shareholders if the largest shareholder is a foreign investor. *Private* is the percentage of shares held by the largest shareholders if the largest shareholder is a private investor. *Size* is the natural log of total assets. *Bank Age* is the natural log of bank's age. The dummy *Listed* equals one if the bank is listed, and zero otherwise. *City GDP* is the natural log of GDP per capita of the city in which the bank's headquarters is located. AR2 is test for second order serial correlation in the first differenced residuals under the null of no serial correlation. Hansen test statistics is the test of over-identifying restrictions based on the null that instruments are valid. Constant is included into the estimation but not reported. The robust error of each coefficient is shown in parentheses. *, **, *** indicate statistical significance level at 10%, 5% and 1%, respectively.

Appendix 2.1 Questions from the World Values Survey used to identify value indicators

Using this card, would you please indicate for each description whether that person is very much like you, like you, somewhat like you, not like you, or not at all like you?

V70.
It is important to this person think up new ideas and to be creative; to do things one's own way.
1. Very much like me 2.Like me 3.Somewhat like me 4.A little like me 5.Not like me 6.Not at all like me
V71.
It is important to this person to be rich; to have a lot of money and expensive things.
1. Very much like me 2.Like me 3.Somewhat like me 4.A little like me 5.Not like me 6.Not at all like me
V75.
Being very successful is important to this person; to have people recognize one's achievements.
1. Very much like me 2.Like me 3.Somewhat like me 4.A little like me 5.Not like me 6.Not at all like me
V76.
Adventure and taking risks are important to this person; to have an exciting life.
1. Very much like me 2.Like me 3.Somewhat like me 4.A little like me 5.Not like me 6.Not at all like me
V77.
It is important to this person to always behave properly; to avoid doing anything people would say is wrong.
1. Very much like me 2.Like me 3.Somewhat like me 4.A little like me 5.Not like me 6.Not at all like me
V160C
I see myself as someone who tends to be lazy:
1. Disagree strongly 2. Disagree a little 3. Neither agree nor disagree 4. Agree a little 5. Agree Strongly 6. Don´t know

Appendix 2.2 Propensity Score Matching Analysis

Before predicting directors' values, we use the propensity score matching method based on a restricted subgroup (i.e., those employed and with high income) in the World Values Survey (China 2012). By employing this approach, we can identify a control sample of individuals in the restricted subgroup in the World Values Survey (China 2012) that show no significant differences in demographic and economic characteristics to bank directors in our treated sample. In this setup, we first employ a logit model to estimate the probability that an individual becomes a bank director, while controlling for the same demographic and socioeconomic variables in predicting values (e.g., individuals' age, gender and education). Then, we use the nearest-neighbor method to match individuals based on the propensity scores (predicted probability of being a bank director). More specifically, each bank director in the treated sample is matched with an individual in the restricted subgroup in the World Values Survey (China 2012). We further require the maximum difference between the propensity score of bank directors in our sample and that of the matched individuals to be 0.02 in its absolute value. Finally, we obtain 397 matched individuals in the World Values Survey (China 2012).

We then test the quality of matching. The results (see Appendix 2.2) show that all of the differences in means for each characteristic are not statistically significant after the matching. In other words, the matched individuals in the control sample are indistinguishable to the directors in the treated sample based on their demographic and economic information. This allows us to predict directors' personal values based on a group of matched individuals (397 matched individuals) in the restricted subgroup in the World Values Survey (China 2012). Additionally, all of the covariates are well balanced (require %bias to be less than 5%).

Table A2.2 Match balance checking

Variable	Unmatched	mean		% reduct		t-test	
	matched	treated	control	% bias	|bias|	t	p>|t|
Age	U	53.106	39.953	132.1		24.10	0.000
	M	52.158	52.331	-1.7	98.7	-0.46	0.649
Gender	U	0.878	0.580	71.2		13.10	0.000
	M	0.871	0.891	-4.9	93.1	-1.29	0.197
Middle level education	U	0.027	0.510	-129.7		-26.02	0.000
	M	0.028	0.025	1.0	99.3	0.45	0.650
High level education	U	0.965	0.309	186.8		36.85	0.000
	M	0.963	0.969	-1.7	99.1	-0.69	0.493
Pscore	U	0.907	0.184	324.3		60.62	0.000
	M	0.901	0.901	-0.2	99.9	-0.06	0.955

Notes: All the observations in treated group and control group have the same income level (high) and the same employment status (employed).

Appendix 2.3 Variables definition

Variables	Definition
Panel A: Bank Performance	
ROA	Net income/ total assets
ROE	Net income/ total equity
Z-score	The natural log of z-score = ln((ROA+E/A)/$\sigma(ROA)$)
NPLratio	Non-performing loans/ total loans
Net Interest Margin	Net interest income / total earning assets
Pre-Provision Profit ratio	(Operating income – operating expense)/ total assets
Panel B: Bank Board Age Diversity	
Age diversity (CV)	Coefficient of variation of board age = sd (age)/mean(age)
Age diversity (LnSD)	Log of the Standard deviation of board age
Age diversity (Blau)	Blau index of board age
Panel C: Directors' Personal Values	
Value Diversity (risk)	Coefficient of variation of directors' value on risk
Value Diversity (prudence)	Coefficient of variation of directors' value on prudence
Value Diversity (wealth)	Coefficient of variation of directors' value on wealth
Value Diversity (success)	Coefficient of variation of directors' value on success
Value Diversity (creativity)	Coefficient of variation of directors' value on creativity
Value Diversity (slackness)	Coefficient of variation of directors' value on slackness
Panel D: Control Variables	
Board Characteristics	
Independent Directors	Percentage of independent directors
Board Size	The natural log of board size
Duality	Dummy variable equals one if bank governor is also chairman of the board, and zero otherwise
Foreign Directors	Percentage of foreign directors
Female Directors	Percentage of female directors
Ownership characteristics	
State	Percentage of shares held by the largest shareholders if the Largest shareholder is the government or a state-owned enterprise
Foreign	Percentage of shares held by the largest shareholders if the Largest shareholder is a foreign investor
Private	Percentage of shares held by the largest shareholders if the Largest shareholder is a private investor
Bank-Specific measures	
Capital Ratio	Equity/total assets
Loan Ratio	Total loans/ total assets
Size	The natural log of total assets
Bank Age	The natural log of bank age
Listed	Dummy variable equals one if the bank has been listed at the end of the year, and zero otherwise
Location effects	
City GDP	The natural log of GDP per capita of city that the bank's headquarter is located

Appendix 2.4 Relation between board age diversity and bank performance: robustness test

	Profitability		Risk	
	ROA	ROE	Z-score	NPLratio
	(1)	(2)	(3)	(4)
Age Diversity	-0.003**	-0.048**	-0.022	0.011*
	(0.001)	(0.018)	(0.058)	(0.006)
Board Size	0.000	0.001	-0.001	-0.000
	(0.000)	(0.001)	(0.003)	(0.000)
Duality	-0.003*	-0.021	0.096	0.005**
	(0.001)	(0.018)	(0.087)	(0.002)
Independent Directors	0.005*	0.078	0.269*	-0.029**
	(0.003)	(0.052)	(0.160)	(0.011)
Foreign Directors	-0.008*	-0.178**	0.621**	0.037**
	(0.004)	(0.076)	(0.303)	(0.018)
Female Directors	0.001	0.020	0.004	-0.003
	(0.002)	(0.056)	(0.143)	(0.008)
State	0.009	0.178	0.188	-0.039
	(0.006)	(0.113)	(0.339)	(0.038)
Foreign	-0.001	0.189	-0.233	0.014
	(0.008)	(0.145)	(0.468)	(0.033)
Private	-0.010**	-0.101	0.012	0.052*
	(0.004)	(0.080)	(0.303)	(0.029)
Size	-0.001	-0.042*	0.045	0.013*
	(0.001)	(0.025)	(0.080)	(0.007)
Listed	0.000	0.000	0.006	0.003
	(0.001)	(0.018)	(0.055)	(0.005)
Loan Ratio	-0.004	-0.081	-0.235	0.027
	(0.004)	(0.072)	(0.256)	(0.020)
Capital Ratio	0.010	-0.587***	2.719***	-0.010
	(0.010)	(0.194)	(0.652)	(0.039)
City GDP	-0.002	-0.022	-0.034	0.001
	(0.001)	(0.025)	(0.076)	(0.004)
Bank Age	-0.000	0.013	0.030	0.013**
	(0.002)	(0.029)	(0.080)	(0.007)
Year Controls	Yes	Yes	Yes	Yes
N	349	349	349	342
R^2	0.242	0.189	0.203	0.218

Notes: This table presents the robust regression results for the effects of age diversity on bank performance (bank profitability and risk) in which age diversity is measured by the log of standard deviation of board age (*LnSD*). The left panel presents result of bank profitability measured by *ROA* and *ROE*. The right panel presents of bank risk measured by *Z-score* and *NPLratio*. *Board Size* is the natural log of board size. The dummy variable *Duality* equals one if bank governor is also chairman of the board, and zero otherwise. *Independent Directors* is the percentage of independent directors. *State* is the percentage of shares held by the largest shareholders if the largest shareholder is the government or a state-owned enterprise. *Foreign* is the percentage of shares held by the largest shareholders if the largest shareholder is a foreign investor. *Private* is the percentage of shares held by the largest shareholders if the largest shareholder is a private investor. *Size* is the natural log of total assets. *Bank Age* is the natural log of bank age. The dummy *Listed* equals one if the bank is listed at the end of the year, and zero otherwise. City GDP is the natural log of GDP per capita of city that the bank's headquarter is located. It employs the panel fixed effect estimator with lagged independent variables. Constant is included into the estimation but not reported. The robust error of each coefficient is shown in parentheses. *, **, *** indicate statistical significance level at 10%, 5% and 1%, respectively.

Appendix 2.5 Relation between board age diversity and bank performance: robustness test

	Profitability		Risk	
	ROA	ROE	Z-score	NPLratio
	(1)	(2)	(3)	(4)
Age Diversity	-0.006**	-0.066	0.011	0.010
	(0.003)	(0.043)	(0.101)	(0.007)
Board Size	0.000	0.001	-0.001	-0.000
	(0.000)	(0.001)	(0.003)	(0.000)
Duality	-0.002*	-0.018	0.089	0.004**
	(0.001)	(0.018)	(0.088)	(0.002)
Independent Directors	0.006**	0.067	0.322*	-0.028**
	(0.003)	(0.056)	(0.171)	(0.011)
Foreign Directors	-0.006*	-0.140**	0.567*	0.027*
	(0.004)	(0.067)	(0.299)	(0.015)
Female Directors	0.001	0.029	0.005	-0.003
	(0.002)	(0.057)	(0.147)	(0.007)
State	-0.002	0.194	-0.310	0.011
	(0.007)	(0.140)	(0.470)	(0.030)
Foreign	0.008	0.174	0.099	-0.041
	(0.006)	(0.112)	(0.348)	(0.039)
Private	-0.010**	-0.084	-0.015	0.050*
	(0.005)	(0.085)	(0.296)	(0.028)
Size	-0.001	-0.037	-0.009	0.013*
	(0.001)	(0.025)	(0.090)	(0.007)
Listed	0.001	0.018	-0.006	-0.000
	(0.001)	(0.013)	(0.053)	(0.005)
Loan Ratio	-0.004	-0.041	-0.278	0.025
	(0.004)	(0.071)	(0.285)	(0.021)
Capital Ratio	0.008	-0.848***	1.778**	-0.001
	(0.012)	(0.261)	(0.790)	(0.043)
City GDP	-0.002	-0.030	-0.018	0.002
	(0.001)	(0.025)	(0.076)	(0.004)
Bank Age	-0.000	0.016	-0.030	0.013**
	(0.001)	(0.029)	(0.091)	(0.007)
Year Controls	Yes	Yes	Yes	Yes
N	349	349	349	342
R^2	0.241	0.189	0.151	0.199

Notes: This table presents the robustness test of regression in Model (1) in which age diversity is measured by Blau index of board age diversity (*Blau*). The left panel presents result of bank profitability measured by *ROA* and *ROE*. The right panel presents of bank risk measured by *Z-score* and *NPLratio*. *Board Size* is the natural log of board size. *Duality* equals one if bank governor is also chairman of the board, and zero otherwise. *Independent Directors* is the percentage of independent directors. *State* is the percentage of shares held by the largest shareholders if the largest shareholder is the government or a state-owned enterprise. *Foreign* is the percentage of shares held by the largest shareholders if the largest shareholder is a foreign investor. *Private* is the percentage of shares held by the largest shareholders if the kargest shareholder is a private investor. *Size* is the natural log of total assets. *Bank Age* is the natural log of bank age. *Listed* equals one if the bank is listed at the end of the year, and zero otherwise. *City GDP* is the natural log of GDP per capita of city that the bank's headquarter is located. It employs the panel fixed effect estimator with lagged independent variables. Constant is included into the estimation but not reported. The robust error of each coefficient is shown in parentheses. *, **, *** indicate statistical significance level at 10%, 5% and 1%, respectively.

Appendix 2.6 Relation between board age diversity and bank profitability: robustness test

	Profitability	
	Net Interest Margin	Pre-Povision Profit Ratio
	(1)	(2)
Age diversity	-0.028*	-0.013**
	(0.015)	(0.006)
Board Size	0.000	-0.000
	(0.000)	(0.000)
Duality	0.003	0.000
	(0.003)	(0.001)
Independent Directors	0.008	0.001
	(0.005)	(0.002)
Foreign Directors	0.006	-0.001
	(0.009)	(0.004)
Female Directors	0.010	0.005**
	(0.007)	(0.002)
State	-0.030*	0.001
	(0.016)	(0.006)
Foreign	-0.010	-0.001
	(0.013)	(0.006)
Private	-0.009	0.003
	(0.011)	(0.006)
Size	0.002	-0.001
	(0.003)	(0.001)
Listed	-0.000	0.000
	(0.002)	(0.001)
Loan Ratio	-0.002	-0.005
	(0.008)	(0.004)
Capital Ratio	0.016	-0.017
	(0.027)	(0.015)
City GDP	-0.001	-0.001
	(0.004)	(0.002)
Bank Age	0.001	-0.002*
	(0.004)	(0.001)
Year Controls	Yes	Yes
N	336	310
R2	0.229	0.171

Notes: This table presents the regression results for the effects of age diversity on bank profitability. The dependent variables are bank profitability (i.e., *Net Interest Margin* and *Pre-Provision Profit Ratio*). *Age Diversity* is measured by coefficient of variation of board age (*CV*). *Board Size* is the natural log of board size. The dummy variable *Duality* is equal to one if the bank governor is also the chairman of the board, and zero otherwise. *Independent Directors* is the percentage of independent directors. *Foreign Directors* is the percentage of foreign directors. *Female Directors* is the percentage of female directors. *State* is the percentage of shares held by the largest shareholders if the largest shareholder is the government or a state-owned enterprise. *Foreign* is the percentage of shares held by the largest shareholders if the largest shareholder is a foreign investor. *Private* is the percentage of shares held by the largest shareholders if the largest shareholder is a private investor. *Size* is the natural log of total assets. *Bank Age* is the natural log of bank's age. The dummy *Listed* equals one if the bank is listed, and zero otherwise. City GDP is the natural log of GDP per capita of the city in which the bank's headquarters is located. It employs the panel fixed effect estimator with lagged independent variables. Constant is included into the estimation but not reported. The robust error of each coefficient is shown in parentheses. *, **, *** indicate statistical significance level at 10%, 5%, and 1%, respectively

Appendix 2.7 Relation between board value diversity and bank performance (Based on the Restricted Group)

	Value diversity (risk)	Value diversity (prudence)	Value diversity (wealth)	Value diversity (success)	Value diversity (creativity)	Value diversity (slackness)
Panel A: Dependent variable is ROA						
ROA	-0.024**	-0.047**	-0.019**	-0.073	-0.027	-0.004
	(0.011)	(0.022)	(0.009)	(0.045)	(0.031)	(0.003)
Year Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	237	237	237	237	237	237
R^2	0.299	0.294	0.295	0.286	0.274	0.279
Panel B: Dependent variable is ROE						
ROE	-0.553**	-0.983**	-0.428**	-1.848**	-0.821	-0.129*
	(0.232)	(0.488)	(0.199)	(0.869)	(0.751)	(0.069)
Year Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	237	237	237	237	237	237
R^2	0.306	0.293	0.299	0.292	0.274	0.285
PanelC: Dependent variable is Z-score						
Z-score	-0.210	0.115	-0.285	0.801	-0.896	0.034
	(0.795)	(1.741)	(0.719)	(2.500)	(2.652)	(0.242)
Year Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	237	237	237	237	237	237
R^2	0.167	0.166	0.167	0.167	0.167	0.166
Panel D: Dependent variable is NPLratio						
NPLratio	0.069	0.046	0.060*	0.054	0.042	0.027*
	(0.042)	(0.089)	(0.035)	(0.151)	(0.128)	(0.015)
Year Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	234	234	234	234	234	234
R^2	0.164	0.228	0.116	0.284	0.243	0.192

Notes: This table presents the robust results for the effects of value diversity on bank performance based on the restricted group. Panel A presents results for regressing *ROA* on various value diversities. Panel B presents results for regressing *ROE* on various value diversities. Panel C presents results for regressing *Z-score* on various value diversities. Panel D presents results for regressing *NPLratio* on various value diversities. For the sake of saving space, the estimation results for control variables are omitted here. Constant is included into the estimation but not reported. The robust error of each coefficient is shown in parentheses. *, **, *** indicate statistical significance level at 10%, 5%, and 1%, respectively.

Appendix 2.8 Relation between board value diversity and bank performance (Bootstrap Regression)

	Value diversity (risk)	Value diversity (prudence)	Value diversity (wealth)	Value diversity (success)	Value diversity (creativity)	Value diversity (slackness)
Panel A: Dependent variable is ROA						
ROA	-0.029**	-0.051*	-0.020**	-0.052	-0.030	-0.003
	(0.013)	(0.026)	(0.010)	(0.036)	(0.028)	(0.003)
Year Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	454	454	454	454	454	454
R^2	0.304	0.298	0.299	0.286	0.276	0.275
Panel B: Dependent variable is ROE						
ROE	-0.651**	-1.049**	-0.439**	-1.370**	-0.848	-0.095
	(0.276)	(0.507)	(0.206)	(0.672)	(0.660)	(0.061)
Year ad Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	454	454	454	454	454	454
R^2	0.314	0.298	0.305	0.297	0.280	0.282
PanelC: Dependent variable is Z-score						
Z-score	-0.037	0.569	-0.122	1.183	-0.232	0.075
	(0.965)	(1.814)	(0.714)	(1.921)	(2.179)	(0.236)
Year Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	454	454	454	454	454	454
R^2	0.192	0.193	0.192	0.194	0.192	0.193
Panel D: Dependent variable is NPLratio						
NPLratio	0.082*	0.051	0.060*	0.033	0.043	0.018
	(0.048)	(0.103)	(0.035)	(0.115)	(0.104)	(0.013)
Year Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	454	454	454	454	454	454
R^2	0.276	0.263	0.276	0.262	0.262	0.270

Notes: This table presents the bootstrap results for effects of value diversity on bank performance. Panel A presents results for regressing *ROA* on various value diversities. Panel B presents results for regressing *ROE* on various value diversities. Panel C presents results for regressing *Z-score* on various value diversities. Panel D presents results for regressing *NPLratio* on various value diversities. For the sake of saving space, the estimation results for control variables are omitted here. Constant is included into the estimation but not reported. The bootstrapped standard error of each coefficient is shown in parentheses. *, **, *** indicate statistical significance level at 10%, 5%, and 1%, respectively.

Chapter 3 Tournament incentives and age heterogeneity

3.1 Introduction

The excessive remuneration of chief executive officers (CEOs) shapes the debate over the workplace wage inequality. The May 2016 issue of *Forbes* reported that in 2015 the average US CEO earned 335 times the pay of an average worker.[20] This huge disparity exists not only between CEOs and average workers, but also between CEOs and other executives. The *Economist* (Jan 25, 2016) asserts that such a pay gap can motivate non-CEO executives to take risks and put in the hours to climb up to the position of CEO. The *Guardian* (Dec 18, 2015) criticizes that such a large pay gap produces demotivated employees and lowers the cohesion among workers. In particular, journalist have intense focus on whether the pay gap between CEOs and other executives can be justified in the aftermath of the 2008 financial crisis.

This debate in the media has coincides with a large amount of research investigating the impact of the compensation gap between CEOs and other executives. On theory, the tournament view, shows that a large pay gap provides inherent incentives for non-CEO executives to expend more effort (e.g., Chen et al., 2011; Eriksson, 1999; Lazear and Rosen, 1981). This mechanism alleviates agency problems, such as managerial shirking and free riding, and leads to better firm performance (e.g., Chen et al., 2011; Henderson and Fredrikson, 2001; Kale et al., 2009; Vieito, 2012). An alternative theory, behavioural perspective, states that a large pay gap creates the feeling of relative deprivation among executive directors (Cowherd and Levine, 1992) and induces sabotage in the collaboration (Dye, 1984). In addition, the CEO entrenchment viewpoint argues that thae large pay gap increases CEO power (Lambert et al., 1993), which results in greater risk-

[20] See more detailed information at: https://www.forbes.com/sites/timworstall/2016/05/17/excellent-news-top-ceos-make-335-times-the-average-american-worker/#553e18eb70f4.

taking for senior executives (Kini and Williams, 2012) and provides incentives for managers to commit fraud (Haß et al., 2015).

Most of the recent empirical studies support the tournament theory and suggest that the tournament effect is often more effective in some cases when the firm has effective corporate governance or the CEO is near the retirement age (e.g., Kale et al., 2009; Lee et al., 2008). While researchers have begun to explore the tournament effect through the characteristic of the firm and the CEO, no previous study has investigated the effect through non-CEO executives. As suggested by Pissaris et al. (2015), firms need the talents, efforts and resources not only from CEOs, but also from non-CEO executives (who also occupy important positions in the top management team). In this paper, I extend the literature by examining the tournament effect through the personal characteristics of non-CEO executives.

Non-CEO executives can be viewed as an appropriate peer group. To compete for the same tournament prize (pay gap), one executive's effort affects the behaviour of her peers and exerts peer pressure on them (Kandel and Lazear, 1992). I argue that the degree of peer competition might depend on the age heterogeneity of non-CEO executives as the previous studies have suggested that age is a significant determinant for a promotion in the workplace (Kunze et al., 2013; Lawrence, 1988; Pritchard et al., 1984 When non-CEO executives are of a similar age, they usually group themselves into the same social category, with a greater perception of fairness (Turner, 1985). At a similar stage of life, non-CEO executives may think that they have similar chances of a promotion, and therefore, compete more fervently. In an age-diverse environment, older executives (because of their rich experience and influence on their field) often occupy the top positions and have a higher chance of promotion within the company (Chen and Chung, 2012). The presence of seniority may lead to reduced incentives for younger executives to compete, as they might anticipate lower probability of winning the prize. In this case,

younger executives are discouraged to compete with older executives unless the younger executives have extremely outstanding talents and managerial abilities. Therefore, the tournament effect becomes weaker when age gaps exist among non-CEO executives, but this effect is stronger when non-CEO executives are of a similar age.

This study contributes to tournament literature in two ways. First, I provide a new insight into the tournament effect by introducing the interaction of non-CEO executives. Previous studies on executive compensation explore the link between pay gap and firm performance only through industry environment (Siegel and Hambrick, 2005), ownership structure (Hu et al., 2013; Lee et al., 2008) and CEOs' background (Kale et al., 2009; Zalewska, 2014). In contrast, this study focuses on a new channel, the age heterogeneity of non-CEO executives, and investigates how it affects the tournament effect.

Second, this study also contributes to the compensation literature by linking society hierarchy to tournament incentives and providing empirical evidence on the hierarchy issue in China. Given the large population and limited resources in China, competition is strong, especially among similar-aged peers as they seek to acquire the same resources simultaneously (Liu and Lafreniere, 2014). Particular to Chinese culture, there is a high value placed on seniority. Based on the Five Code of Ethics by Confucian, there is an age hierarchical structure of human relationship. Elderly people usually enjoy the high status and the most valuable resources (Bond and Hwang, 1986).

The estimation sample is collected from CSMAR and consists of 18,898 firm-year observations, encompassing 2,600 Chinese listed firms from 2005 to 2015. I first document a significant and positive relationship between executive compensation gap and firm performance, which is consistent with the implication of the tournament theory. The larger pay gap acts as the tournament incentive which motivates the non-CEO executives to expend more efforts in their work. As a result, this higher level of effort by

non-CEO executives leads to higher firm output and better performance. To further investigate this relationship, I estimate whether the tournament effect can be affected by the age heterogeneity of non-CEO executives. The empirical findings suggest that when non-CEO executives come from three or more age cohorts, the tournament effect becomes weaker. This is because the presence of seniority discourages young executives to compete as fervently. Furthermore, when the non-CEO executives are from the same age cohort, the age similarity heightens peer competition among those non-CEO executives and enhances the tournament effects. In addition, I find that the impact of age heterogeneity on the tournament effect is more pronounced at state firms than at private firms. This is because in China the importance of seniority is overemphasized in state firms. This analysis is robust to several alternative measures of tournament incentives, age heterogeneity and firm performance.

The findings from this study are relevant not only for China but also for other countries in which seniority is highly valued. I provide interdisciplinary implications for corporate governance and human resource management. The tournament effect is an important incentive mechanism to motivate non-CEO executives at firms. Furthermore, the psychological composition of non-CEO executives is important to the effectiveness of the tournament incentives. Thus, the sociological values of executives should be taken into account in the setting of internal pay structure. Additionally, companies should learn to manage the generational gaps in non-CEO executives and utilize the benefits of the gaps to have a better understanding of optimal executive composition.

This paper is organized as follows. In Section 3.2, I discuss the literature about the tournament incentives, age similarity and firm performance. Section 3.3 describes the sample composition and methodology. In Section 3.4, I discuss the empirical results. Section 3.5 contains robustness checks. Concluding remarks are provided in Section 6.

3.2 Literature review

3.2.1 Tournament incentives and firm performance

CEOs' high salary continues to shoot upwards, widening the pay gap between CEOs and other senior executives. This large CEO pay gap cannot be completely explained by conventional marginal product argument (O'Reilly et al., 1988). In a competitive market, all the executives are paid at the value of their marginal products. When a non-CEO executive is promoted to the position of CEO, his/her salary is likely to double or triple. However, it is difficult to state that this executive's managerial skills have simultaneously doubled or tripled in that one-day period.

To address this puzzle, Lazear and Rosen (1981) propose tournament theory in the context of prize. Similar to a golf game, tournament participants compete with each other and are paid based on their rank in the competition. What matters in the tournament is not the absolute performance of the player, but player performance compared to other competitors. Thus there are typical winners and losers in the tournament. Non-CEO executives aspiring to the position of CEO also can be viewed as competing in a tournament (Lazear and Rosen, 1981). The tournament prize (i.e., pay gap between CEO and other executives) is fixed in advance and is paid based on non-CEO executives' relative performance. The winner of the tournament is promoted to the position of CEO and receives the prize, equivalent to the pay gap. The possibility of attaining this high status provides irresistible incentives for non-CEO executives to expend more efforts. These higher efforts can increase each executive' chance of winning the prize.

When the supervision is reliable and the monitoring costs are low, paying the executives at the value of their marginal product is an optimal remuneration scheme (Henderson and Fredrikson, 2001). It is relatively easy for the firm to make promotion based on executives' marginal product. However, in reality, the monitoring is always costly and unreliable in modern corporations, which encourages managerial shirking and the free rider problem

(Jensen and Meckling, 1976). In this case, the absolute performance-based contract is not optimal because managers are more likely to manipulate the output when the performance is unobservable. In the agency framework, rank order tournament incentives is preferable because it can alleviate the agency problem (Lazear and Rosen, 1981). Large prizes provide contestants with stronger incentives to perform better than other competitors. As a result, the interests of managers and shareholders tend to align under the tournament competition, which ultimately improves firm performance. Additionally, Becker and Huselid (1992) also argue that compensations based on marginal product or absolute performance are difficult to measure precisely, while rank order rewards seem to be more feasible and simpler with lower associated information costs.

The efficiency of the tournament structure has been criticized by a number of studies. It has been found that the executives engaged in the tournament may collude with others to reduce their efforts and increase their utilities at the same time (Dye, 1984). Based on the entrenchment argument, a large pay gap between the CEO and other executives increases the power of CEO (Lambert et al., 1993) and results in agency problems. Entrenched CEOs can increase their ability to set their own pay and expropriate shareholders' wealth (Bebchuk et al., 2011; Kale et al., 2009). In addition, from a behavioural perspective, lower level managers are also found to experience a feeling of relative deprivation due to the large pay gap (Cowherd and Levine, 1992). People often compare outputs with superiors' outputs, ignoring the input differences between themselves and superiors (Martin, 1979). Given the fact that the inputs are difficult to measure, CEO pay gaps may be perceived as unfair even though CEOs contribute more inputs than other executives. As a result, the feeling of deprivation discourages coordination and invites sabotage in the group (Lazear, 1989).

The empirical literature provides mixed findings regarding the effect of the pay gap between CEOs and other executives on firm performance. Based on Lazear and Rosen

(1981), tournament incentives result in higher equilibrium levels of effort and therefore deliver better firm performance. The existing studies that support the tournament theory mainly come from US. Lee et al. (2008) document a positive relationship between firm performance and the pay disparity among the top five highest paid executives. More specifically, the tournament incentives are enhanced in firms with high agency costs related to managerial discretion and with effective corporate governance (i.e., high level of board independence). Similarly, findings by Kale et al. (2009) also support the effectiveness of tournament incentives. The pay gap between CEO and vice presidents (VPs) is associated with better firm performance. These studies also provide evidence that the tournament incentives are conditioned on the probability of promotion. When the acting CEO is near his/her retirement age, the tournament incentive becomes stronger, while the tournament effect diminishes when the firm receives a new and outsider CEO. Additionally, Mobbs and Raheja (2012) add to the empirical evidence by showing that maintaining the tournament-incentive promotion scheme is more valuable when the human capital for the CEO position is not firm-specific.

Several studies find that the tournament theory fits well with Chinese firms. A larger pay gap is positively associated with better firm performance. More specifically, the positive tournament effect is stronger for Chinese firms with greater managerial power, as measured by CEO tenure and ownership of the largest shareholder (Lin and Lu, 2009). Chen et al. (2011) and Kato and Long (2011) both find that state ownership reduces the tournament incentive for other senior executives. The positive relationship between pay gap and firm performance is stronger for non-state firms. Similarly, Hu et al. (2013) document that pay dispersion provides incentives for the executives to work harder and produce better firm performance, especially at privately controlled firms. Furthermore, the CEOs' political connection exerts an impairment effect which weakens the tournament incentives.

However, some studies fail to reach a consistent conclusion regarding the implications of tournament theory. In the US, Bebchuk et al. (2011) find that CEO pay slices, which reflect the CEO centrality, are associated with the agency problem. Therefore, the pay dispersion among executives lowers firm performance. Zalewska (2014) utilizes a sample of UK firms and finds that the higher remuneration disparity in UK boards is associated with worse firm performance. Furthermore, this negative link is sensitive to the composition of boards by nationality. Regarding the Chinese studies, Lin et al. (2013) find that the tournament theory only works well for firms in specific industries, such as firms in the non-high-tech sector. This is because high-tech firms demand effective cooperation to deal with their uncertain and competitive business environment. The pay disparity disables coordination at the top management level and poses a negative influence on firm performance.

Overall, the tournament theory provides a solid theoretical foundation for the positive role of pay disparity among executives. Larger pay gap can reduce the monitoring costs and provide strong incentives to better align the interests between managers and shareholders. Furthermore, most of the empirical studies in US and China provide consistent results indicating that tournament incentives motivate executives to expend optimal effort to secure their promotion and thereby ultimately increases firm performance. Based on prior research, I test the following hypothesis:

H1: The pay gap between executives is positively associated with firm performance.

Although there are several works on tournament incentives in China, this study differs significantly in methodology and structure. To estimate the first hypothesis, I employ a more comprehensive dataset which covers each individual executive's compensation information, while the previous studies only have remuneration data for the CEO, the total for the three highest paid directors in total and remaining management team, or the top three highest paid individual executive (Chen et al., 2011; Hu et al., 2013; Kato and

Long, 2011; Lin and Lu, 2009).

3.2.2 Peer effect, age and seniority

Peer effect exists when a person's behaviour is affected by her interaction with peers who have similar status (Winston and Zimmerman, 2004). A broad literature seeks to investigate the importance of peer group influence in determining the behaviour or performance of the individual in the group. Most of these studies focus on the peer effect on teenagers' behaviours (Gaviria and Raphael, 2001), education achievement (Hanushek et al., 2003), workers' ability and wage (Chan et al., 2014; Mas and Moretti, 2009) and firms' strategies and behaviours (e.g., Francis et al., 2016; Kaustia and Rantala, 2015; Leary and Roberts, 2014). In the workplace, incentives embedded in the compensation exert an influence on the interaction of employees, such as helping, competing with or sabotaging their peers (e.g., Itoh 1991; Kandel and Lazear, 1992; Lazear 1989; Siemsen et al., 2007). Non-CEO executives can be viewed as a peer group. To compete for the same tournament prize, one non-CEO executive's effort can affect the behaviour of his/her peers and exert peer pressure on them.

Liu and Lafreniere (2014) argue that the competition among peers is inevitable because they seek to acquire the same resources. This is especially true for similar-aged peers who often need the same resources at simultaneously to develop themselves successfully. Thus, the degree of competition might depend on an individual's characteristics, particularly their age. At the group level, age is a salient variable of social categorization. Same-aged individuals attract each other and usually group together (Lawrence, 1988). This can be explained by the social category theory (Turner, 1985) and similarity-attraction theory (Byrne, 1971). Individuals born in the same age group are more likely to develop value similarities. Furthermore, higher demographic similarity leads to a greater perception of fairness (Tajfel, 1970). Under the tournament promotion system, non-CEO executives of a similar age might consider themselves to be the same from social category and have similar experience, thereby having similar probability of winning the tournament prize.

Thus, non-CEO executive are more likely to compete aggressively with their similar-aged peers.

At many workplaces, employees come from different age cohorts. In an age-diverse team where there are relatively senior/older individuals, the age discrimination is likely to exist, which produces the feeling of "collective relative deprivation" (Snape and Redman, 2003). For example, younger employees might have an impression that members in their age group are constantly disadvantaged due to their young age while other senior or older groups are favoured (Kunze et al., 2013). The feeling of relative deprivation reduces the competition and leads to the perception of unfairness.

Furthermore, Lawrence (1984) argues that there is a clear expectation that specific positions should be held by individuals of a specific age group across the corporate hierarchy. This is because age conveys information of an individual's cumulative human capital, such as their education, experience and intellectual ability (e.g., Child, 1974; Medawar, 1952; Rhodes, 1983). In this case, career opportunities might be heavily age-biased at firms with heterogeneous age composition (Kunze et al., 2013). Usually, the supervisors and employees at the higher ranks of the corporate ladder are older than those at the lower levels. This phenomenon is quite common in countries which are influenced by Confucianism. In these countries, seniority is highly valued and the elderly are traditionally considered to be the locus of wisdom, authority and power. In Chinese society, the ethical morality of respect for seniority is the product of Confucianism dating back to antiquity. The senior people enjoy power not only in the household but also in politics and organizations (Chen and Chung, 2012). Compared with younger people, older individuals are generally believed to possess a richer experience, vaster knowledge and greater influence/reputation in the specific field (Mishra and Jhunjhunwala, 2013).

3.2.3 Tournament incentives, age heterogeneity and performance

Compared with existing studies on the relationship between pay gap and firm performance, our study takes the research a step further by exploring the tournament effect through the personal characteristics of non-CEO executives. More specifically, I add to the existing tournament literature by investigating whether the age heterogeneity of non-CEO executives changes tournament effects at Chinese firms. On the basis of social categorization theory, higher age similarity among non-CEO executives leads to group integration and greater perception of fairness. Grounded in the peer effect argument, peer competition is heightened in similar-aged peer group. Under the tournament promotion system, non-CEO executives of similar ages think that they have similar chances to win the prize and compete more. In this way, I expect the peer competition among non-CEO executives of a similar age to enhance the tournament effect in the firm. In relation to the age discrimination and seniority arguments, older non-CEO executives are generally more experienced, possess greater vast knowledge and have greater influence in their field when compared to younger executives. Therefore, ceteris paribus, I would expect elderly non-CEO executives to be more likely to get promoted at Chinese firms. Younger executives have a relatively lower chance for promotion unless they have extremely outstanding talent and competence. Seniority might lead to reduced incentives for young non-CEO executives to compete with senior executives. Thereby younger executives might devote less effort in their work, which would ultimately weaken the tournament effect for the firm. Consequently, I pose the following hypothesis:

H2: The positive tournament effect is weaker in firms with a higher level of age diversity among non-CEO executives.

3.3 Sample selection and research design

3.3.1 Sample and data sources

The data is obtained from the China Securities Market and Accounting Research (CSMAR) database. In 2001, the China Securities Regulation Committee (CSRC)

promulgated *the Rules No. 2 on Contents and Format of Information Disclosure by Companies Offering Securities* according to which listed firms are required to disclose the remuneration for individual executives, directors and supervisors. In response to the code, most companies complied from 2002 onwards by disclosing the aggregated compensation of the top three executives only. The remuneration disclosure protocol improved again after 2005 when companies began reporting the payment of individual executives. This is the main consideration why this sample period starts from 2005.

The original CSMAR database reports 1,342 companies being listed on the Shanghai or Shenzhen Stock Exchanges in 2005, which increased to 2,690 companies by 2015. Following the previous studies (Chen et al., 2011; Hu et al., 2013; Lin et al., 2013), I apply a number of screenings. First, I exclude financial firms due to their unique accounting characteristics. Second, CEO is defined as the person who is the chief executive officer or general manager after which all other executives are classified as non-CEO executives. Then only companies that have an identifiable CEO and at least three non-CEO executives with the disclosed remuneration and demographic information (e.g., age and gender) for each are included (Kale et al., 2009). I further excluded companies which have less than two observations. After the filtering procedures, the final estimation sample consists of 18,898 firm–year observations.

3.3.2 Model specification

I hypothesize (H1) the positive effect from pay disparity on firm performance. To test this hypothesis, I employ the following model (1):

$$Firm\ Performance_{it} = \alpha + \beta Pay\ Gap_{it-1} + X_{it-1}\delta + \theta_t + \mu_i + \varepsilon_{it} \qquad (1)$$

where i is the firm identifier and *t* is the year. The key interest of coefficient, β, captures the influence of gap disparity between CEO and other executives ($Pay\ Gap$) on firm performance. Year and firm fixed effects are denoted by θ and μ, respectively. Finally, ε is the error term, while X is the vector of control variables as discussed below.

To further explore the relationship between the pay gap and firm performance, we then test H2 which links the age heterogeneity of non-CEO executives to the tournament effects at the firm. We extend model (1) and estimate the following specification:

$$Firm\ Performance_{it} = \alpha + \beta Pay\ Gap_{it-1} + \gamma Age\ Heterogneity_{it-1} + \varphi Pay\ Gap_{it-1} * Age\ Heterogeneity_{it-1} + X_{it-1}\delta + \theta_t + \mu_i + \varepsilon_{it} \quad (2)$$

Model (2) includes the age heterogeneity of non-CEO executives and its interaction term with the pay gap. The coefficient of the interaction variable φ in model (2) captures the effect of age heterogeneity of non-CEO executives and the pay gap on firm performance. Both model (1) and (2) are estimated by fixed-effects (FE) estimator with robust standard errors. All right hand side variables are lagged to reduce simultaneity concerns.

3.3.3 Variable description

3.3.3.1 Pay gap

Following Bognanno (2001), Eriksson (1999) and Kale et al. (2009), the main tournament measure is the gap between the compensation of CEO and the median value of compensation of non-CEO executive.[21] In this study, I use total cash remuneration because Chinese listed firms only disclose the total cash payment without dividing it into salary and bonus. Then I apply the logarithmic transformation of the pay gap as follows, log ($Pay\ Gap_1$)= log (Compensation of CEO – Median value of compensation of non-CEO executives)

Additionally, given the fact that the CEO is not the highest paid executive in some cases, I construct another tournament measure based on executives' payment rank order. Similar

[21] There are some cases in which the CEO is not the highest paid executive in the firm and the CEO's remuneration is less than the median compensation of non-CEO executives, which results in negative pay gap. To address this issue, we follow Hartman (1984), Cassou (1997) and Kale et al. (2009) to add the absolute value of the minimum negative pay gap to each observation in order to transform all the observations monotonically.

to Chen et al. (2011), I employ the remuneration difference between highest paid executive and second highest paid executive.

log ($Pay\ Gap_2$) = log (Compensation of highest paid executive − compensation of second highest paid executive)

3.3.3.2 Age heterogeneity of non-CEO executives

Previous studies on heterogeneity or dispersion usually use the coefficient of variation, standard deviation and Blau index. I employ a different method to measure the age heterogeneity of non-CEO executives. As mentioned before, a cohort of individuals of a similar age is more likely to group themselves together due to their similar life experience. I rely on the age cohort composition to construct the age heterogeneity measure. There is no consensus about how to define generations in China. Studies generally reach an agreement that each generation comes into existence with a particular social movement with a shared experience (Sun and Wang, 2010) and that most of an individual's values become entrenched in one's late-teens (Ralston et al., 1999). According to this framework, the cohorts are defined as four groups that correspond to specific social and political events at the age of 18 based on executives' birth year: 1926 – 1947 cohort (the Communist Consolidation generation), 1947 – 1958 cohort (the Cultural Revolution generation), 1958 – 1974 cohort (the Social Reform generation) and 1974 – 1992 cohort (the Societal generation) (Egri and Ralston, 2004; Ralston et al., 1999).

To measure the age dispersion, I first calculate the number of cohorts among non-CEO executives. In this way, I construct three dummy variables. *1 Cohort* equals to one if the non-CEO executives are in the same age cohort and zero otherwise. *2 Cohorts* equals to one if the non-CEO executives are from any two different age cohorts and zero otherwise. *3+ Cohorts* equals to one if the non-CEO executives are from any three or more different age cohorts and zero otherwise. The larger the number of cohorts, the higher the age heterogeneity level is.

Following Goergen et al. (2015), I also measure the age similarity of non-CEO executive

using a dummy variable which equals to one if the age difference between the oldest non-CEO executive and the youngest one is less than 20 years (*Age Similarity (<20)*) and zero otherwise.[22] Furthermore, the logarithm of standard deviation of non-CEO executives' age (*Log (Age Sd)*) is employed as an alternative measure of age heterogeneity.

3.3.3.3 Firm performance and control variables

I employ three measures to proxy firm performance. Return on Assets (*ROA*) is the ratio of firm's net income to total assets. Returns on Equity (*ROE*) is defined as firm's net income divided by book value of total equity. Additionally, Chen et al. (2011) find that pay disparity between top three executives has impact on earnings per share (*EPS*) at Chinese firms. Lastly, we include *EPS* as a proxy of firm performance.

Control variables (Vector X) are grouped into four categories. First, three variables on board characteristics include the natural logarithm of board size (*Board Size*), which is found to have a significant effect on firm performance (Yermack, 1996), the percentage of independent directors (*Independent Director*) who may have strong incentives to scrutinize the management (Chen et al., 2011; Zalewska, 2014), and a dummy variable (*Duality*), which equals one if the chief executive officer (CEO) is also the chairman. Second, I control for executive-specific characteristics, that is, the percentage of female executives (*Female Executives*) in this study. Since I need to measure the age heterogeneity in non-CEO executives in model (2), the natural logarithm of CEO age (*CEO Age*) and the average age of non-CEO executives (*Executives Age*) are also included. Third, I employ the ownership control variables as ownership structure is related to firm performance (Himmelberg et al., 1999; McConnell and Servaes, 1990). The proportions of shares owned by state-owned enterprises/ central/local governments (*State*), a foreign investor (*Foreign*), or a private investor (*Private*) are included. Fourth,

[22] In sociology literature, some studies define a generational gap as 20 years (e.g., Strauss and Howe, 1997).

some firm-specific characteristics are also included. Firm size (*Size*) is measured by the natural logarithm of total assets. I also calculate the leverage of the firm (*Leverage*), defined as the ratio of debt to total assets. The natural logarithm of the number of years since the firm has been listed is also included (*List Age*).

3.3.4 Descriptive statistics

The sample includes complete compensation information for 155,906 individual executives and 18,898 firm-year observations over an 11-year period. Table 3.1 presents descriptive statistics for the main variables in this sample. More specifically, Panel A reports firm performance measures. Similar to other studies on China (e.g., Chen et al., 2011; Hu et al., 2013; Lin and Lu, 2009), ROA and ROE are on average 0.05 and 0.08, respectively. The average value of EPS is 0.36. Moreover, all of these performance measures are positively correlated.

<Insert Table 3.1 about here>

Panel B focuses on the measure of the tournament incentive. This sample is consistent with the tournament theory in that the remuneration of CEOs is greater than that of median non-CEO executives, with an average gap of 196.60 thousand CNY (30.24 thousand USD), which is slightly lower than the figures shown in the study of Hu et al. (2013) who subtract CEO's remuneration from the median payment of the top five executives at a Chinese firms. The pay gap has a large spread with 37,483 thousand CNY (2,753.86 thousand USD) as the maximum value. Furthermore, the average pay gap at Chinese listed firms has an upward trend increasing from 79.73 thousand CNY (9.73 thousand USD) in 2005 to 273.53 thousand CNY (43.91 thousand USD) in 2015 (more than quadrupled). With respect to the alternative tournament measure, I also note that the pay gap between the highest paid executive and second highest paid executive is 157.79 thousand CNY (24.25 thousand USD) on average. This compensation disparity between CEO and other executives at lower level in the corporate is also in line with the Chinese culture of high power distance (Hofstede and Hofstede, 2001). In China, the power imbalance between superior and subordinates is prevailing, which makes the wage

disparity acceptable in the workplace.

Panel C presents the age characteristics of non-CEO executives. After dividing all non-CEO executives into four different cohorts based on their birth year, I find that non-CEO executives who are from any two different cohorts account for more than half of the whole sample. Figure 1 shows that one cohort composition remains stable at around 20 percent. While the percentage of non-CEO executive with three or more age cohorts fluctuates between 20% and 30% from 2005 to 2015. Additionally, the age spread in non-CEO executives is less than 20 years for 68% of all observations.

<Insert Figure 3.1 about here>

Panel D reports control variables. In China, the average board size is nine, and on average 37% of the directors are identified as independent directors. This is similar to Hu et al. (2013) and satisfies the requirement of CSRC that more than one third of the board should be comprised of independent directors. Turning to executives, female executives account for 14% of the total number of directors. On average, 21% of the CEOs also hold the dual position of chairman. The average age of non-CEO executives is 46.48, ranging from 33.42 to 60.63, while CEOs have an average age of 47.92. With regard to ownership structure, the state ownership control is at 11%. Furthermore, on average, the leverage is around 0.45 which is comparable with that shown as 0.46 in Hu et al. (2013). When looking at the firms' listed history, I find that in this sample the firms' average listed age is around nine years.

3.4 Empirical analysis

3.4.1 Tournament incentives and firm performance

The first hypothesis (H1) predicts that the pay gap between CEOs and non-CEO executives serves as a tournament incentive and increases firm performance. Table 3.2 reports the fixed effects regression results. The first three columns (1) – (3) present the results using the gap between CEO pay and median pay of non-CEO executives (*Log*

($Pay\ Gap_1$)). In the columns (4) – (6), *Log* ($Pay\ Gap_1$) is replaced with *Log* ($Pay\ Gap_2$), the pay difference between the highest and the second highest paid executive. Consistent with the hypothesis, these two measures of tournament prize are positively and significantly associated with firm performance in all specifications. More particularly, a 10% increase in executive pay gap (*Log (*$Pay\ Gap_1$)) results in 0.18 percent point, 0.43 percent point and 1.54 CNY (0.22 USD) increase in *ROA*, *ROE* and *EPS*, respectively. When I use the second measure *Log (*$Pay\ Gap_2$*)*, the magnitude of change for firm performance is slightly smaller. A 10% rise in the pay disparity improves *ROA* by 0.01 percent point, *ROE* by 0.02 percent point and *EPS* by 0.07 CNY (0.01 USD). These results support the tournament theory. The huge pay gap between the CEO and executive at lower levels serves as an efficient incentive, which motivates non-CEO executives to expend substantial effort to win the chance of promotion, and consequently this leads to better firm performance.

<Insert Table 3.2 about here>

With respect to the control variables, ownership structure plays an important role. Similar to Chen et al. (2011) and Kato and Long (2011), the state ownership is associated with better firm performance in all specifications at the 1% level. In other words, the political connection really of a Chinese firm greatly influnences performance. Firms in which the controlling shareholder is a private investor perform better as well, but foreign ownership fails to have any influence on firm performance. The degree of leverage is positively related with firm performance in all specifications. Furthermore, firms with larger size show worse levels of *ROA* and *ROE*. In terms of *EPS*, I find that the length of listed years exerts significant and negative influence on *EPS* at the 1% level.

3.4.2 Age heterogeneity, tournament incentives and firm performance

In this section, I test the second hypothesis of whether the age heterogeneity of non-CEO executives can affect the relationship between the pay gap and firm performance. Pay gap measures are interacted with age variables in Table 3.3. Interaction terms with Log ($Pay\ Gap_1$) are presented in the first three columns and with Log ($Pay\ Gap_2$) are in the

following three columns.

<Insert Table 3.3 about here>

I focus on the coefficients of the interaction terms which are the basis of the inferences. In the first three specifications, the estimated coefficients of the interaction between pay gap and the number of age cohorts are all significant and negative. Furthermore, the negative effect increases with the number of age cohorts in non-CEO executives, indicating that the number of age cohorts among non-CEO executives matters for tournament effects. More specifically, when the non-CEO executives come from any two different age cohorts, the positive relation between the executive pay gap on performance becomes weaker than those from one age cohort. The coefficients of the interaction term are significant at the 1% level for both *ROA* and *ROE* and the 5% level for the *EPS* specifications. Turning to the interaction term of pay gap with any three and four different age cohorts (*3+ Cohorts*), the tournament effect becomes much weaker compared with larger magnitude of coefficients for the first three specifications being significant at the 1% level. Thus, the larger the number of age cohorts among non-CEO executives, the weaker the tournament effect is.

Similar to the first three specifications, the coefficients of the interaction of *Log* $(Pay\ Gap_2)$ with the cohort variable (*3+ Cohorts*) in the next three columns are significant and negative at the 5% level for both *ROA* and *EPS* and at the 1% level for *ROE*. This means that the tournament effect becomes much weaker when the non-CEO executives come from three or four generations compared to those from one generation. Therefore, there provides additional evidence to support the H2 that the tournament effect is weaker when the non-CEO executives have heterogeneous ages.

The results shown in Table 3.3 are consistent with the seniority argument. Previous studies suggest that seniority is highly valued in China. Senior people usually enjoy high status in the workplace in China due to their rich experience, vast knowledge and

reputation in their field (Chen and Chung, 2012; Mishra and Jhunjhunwala, 2013). The results suggest that seniority reduces the incentives for younger non-CEO executives and discourages them to compete with older ones. As a result, younger executives expend less effort to compete for the position of CEO due to their lower chance of winning the prize of promotion.

<Insert Table 3.4 about here>

In Table 3.4, I estimate the interaction term of pay gap with cohort measures separately. The results of age measure (*1 Cohort*) are reported in the first three columns. I then replace *1 Cohort* with *3+ Cohorts* in the next three columns. In Panel A of Table 3.4, the estimated coefficients of the interaction of *Log (*$Pay\ Gap_1$*)* with age measure (*1 Cohort*) are all significant and positive at the 1% level for *ROA* and *ROE* and the 5% level for *EPS*. This indicates that the tournament effect becomes stronger when the non-CEO executives come from one generation, which is consistent with the hypothesis H2. The results confirm the peer effect argument which implies that the competition among similar-aged peers is fiercer. An executives' effort impacts the well-being of his similar-aged peers and exerts pressure on them. To compete for the same tournament prize, the peer pressure among these similar-aged executives stimulates the competition and motivate them to expend more efforts in their quest for promotion.

In the next three specifications, the coefficients of interactions are all negative and significant at the 5% level for *ROA* and *EPS* and the 1% level for *ROE*. This suggests that the tournament effect becomes weaker when the non-CEO executives are from three or more different generations. This result offers additional supports for the hypothesis H2 that the tournament effect diminishes when the ages of non-CEO executives are heterogeneous. In Panel B, I replace the tournament measure *Log (*$Pay\ Gap_1$*)* with *Log (*$Pay\ Gap_2$*)*. Consistent with Panel A, the interaction terms with *3+ Cohorts* are significant and positive at the 1% significance level in all specifications, indicating weaker tournament effects. Furthermore, for the interaction terms with *1 Cohort*, we only

find significant and positive coefficient when the firm performance is measured by *ROE,* which suggests stronger tournament effect.

3.4.3 Does the impact of age diversity on tournament effect vary by ownership?

As an important ethical philosophy, Confucianism has been deeply rooted in the Chinese society. Based on the Confucian teaching of Five Code of Ethics, the seniority is one of the most important rules for human relationship. In recent years, the Chinese Community Party has paid special emphasis on the important role of Confucianism in the new age of reform (Du, 2015) and made seniority one of the most discernible factors for nominating government candidates in China (Chen and Chung, 2002). Anecdotal evidence shows that elderly people play an important role in Chinese politics. For example, according to the BBC (October 25, 2017), the age of the Chinese top leaders in the Politburo's Standing Committee averages at 62.85, ranging from 60 to 67. This phenomenon of seniority has extended from politics to the workplace, especially state firms where executives are promoted within the Chinese Communist Party (CCP) and government. The recent press (People.cn, Oct 2016) criticizes that state firms should eradicate the idea of seniority as a basis for promotion, and instead promote the younger candidates who are talented and competent. We therefore compare moderate effect of age diversity in state firms and non-state firms.

<Insert Table 3.5 about here>

We focus the analysis on two sub-groups: state firms, where the controlling shareholder is the state-owned enterprise or governments, and non-state firms, where the controlling shareholder is the non-state-owned domestic legal persons or foreign legal persons. Table 3.5 shows that the coefficients of the interaction terms for *3+ Cohorts* are negative and significant for state firms in *ROE* and *EPS* specifications at the 5% level and in *ROA* specification at the 1% level. In columns (4) to (6), the coefficient of the interaction term for *3+ Cohorts* is significant and negative only when the firm performance is measured by *ROA*. The results confirm our argument that the negative influence of age diversity on tournament effect is more significant in state firms than non-

state firms due to the outmoded practice of seniority is overstressed at governments and state firms.

3.5 Robustness checks

3.5.1 Instrument variables approach

In this section, we consider the concern that the relationship between compensation gap and performance may be biased because of the possible correlation between independent variables and the error term. Executives' pay gap might act as a tournament incentive to motivate them and consequently improve firm performance. Alternatively, firms that perform better may compensate their CEOs more than other subordinates, widening the remuneration gap. To address the potential endogeneity problem, we employ a fixed effect instrumental variable approach using Lewbel's (2012) method, which includes internal and external instrumental variables. Following Kale et al. (2009), our main instrumental variable is the median value of compensation gap for the firm in the same industry and the same size group as the firm.[23] The rationale is based on Murphy (1999) who argues that there are variations in compensation level and structure according to different industries and firm size. Furthermore, we also follow Kale et al. (2009) and Hu et al. (2013) to include the number of non-CEO executives (*No. of non-CEO Executives*) and introduce a new CEO dummy (*New CEO*) as instruments for compensation gap.

Tables 3.6a/3.6b presents the results from estimating the fixed effect model (2) using the instrument variable approach. In Table 3.6a, the coefficients on instruments, Median Industry Values, *No. of non-CEO Executives* and *New CEO* are statistically significant in the first stage regression. In addition, the F-statistics for all specifications in the first stage are all greater than 10, indicating the joint relevance of all instruments. In Table 3.6b, the LM statistics and Hansen J statistics both show that these three instruments in our study

[23] When calculating the industry-level median value, we exclude that specific firm and only focus on other firms in the same industry.

satisfy the relevance and validity criterion in all specifications. Consistent with our main results in Table 3, the coefficients of interaction terms are negative (significance at the 1% level) and the magnitude of the coefficients become larger with *3+ Cohorts*. This indicates that the main results are robust.

<Insert Table 3.6a about here>

<Insert Table 3.6b about here>

3.5.2 Performance persistence

Performance persistence is often a focus of corporate governance research (e.g., Georgen et al., 2015; Liu et al., 2014; Sila et al., 2016). The previous realization of dependent variables might affect the current level of some of the independent variables. In this study, current compensation disparity between executives may be the result of past firm performance. It may be the case that firms with better past performance reward the CEO with higher remuneration, widening the pay gap at the top level. To address this issue, we follow Wintoki et al. (2012) to employ Dynamic Panel Data Generalized Method of Moments (GMM) model (Arellano and Bond, 1991), which accounts for unobserved heterogeneity as well as dynamic relation between pay gap and firm performance.

$$Firm\ Performance_{it} = \alpha + \gamma Firm\ Performance_{it-1} + \beta Pay\ Gap_{it} + X_{it}\delta + \theta_t + \mu_i + \varepsilon_{it} \quad (3)$$

All the independent variables are assumed to be endogenous except year dummies. The instruments used in the GMM estimation include the lagged difference (t-2) of endogenous variables and dependent variables for level equations and the lagged levels (t-2 to t-4) of endogenous variables and dependent variables for difference equations. Table 3.6, similar to previous results, reports significant negative effects of age heterogeneity on tournament. However, all specifications pass the test for second-order serial correlation, while fail to pass Hansen test of over-identification.

<Insert Table 3.6 about here>

3.5.3 Alternative measures of tournament incentive and age heterogeneity

I re-estimate previous analysis using several alternative measures of tournament incentives and age heterogeneity. With respect to the alternative tournament measures, I use the logarithm of standard deviation of executives' pay (*Log (Pay Sd)*) and the compensation gap between the CEO and the mean value of other executives (*Log* $(Pay\ Gap_3)$) in Table 3.9. I find that Log ($Pay\ Gap_3$) is positive and statistically significant at the 1% level in the first two specifications. When replacing Log ($Pay\ Gap_3$) with *Log (Pay Sd),* the positive relationship between pay gap and firm performance still holds for the last three specifications. These results are similar to the previous findings and support H1 that the pay gap acts as a tournament incentive to motivate executives and increases firm performance.

<Insert Table 3.9 about here>

Following Goergen et al. (2015), I replace the cohort composition measures with the age similarity measure (*Age Similarity (<20)*) in Table 3.10. The coefficients of interaction terms are positive and statistically significant when the pay gap is measure by *Log* $(Pay\ Gap_2)$. When *Log* $(Pay\ Gap_2)$ is the pay disparity measure, interaction terms are positive and significant in two of three specifications (*ROA* and *ROE*). Consistent with previous results, this table provides additional evidence to support H2 that peer pressure stimulates the competition among non-CEO executives who are from the same age cohort and enhances the tournament effects.

<Insert Table 3.10 about here>

Furthermore, I employ the logarithm of the standard deviation of non-CEO executives' age *(Log (Age Sd))* as another alternative measure and present the results in Table 3.11. Similar to previous results, the interaction terms are statistically significant and negative in the first and the last two specifications. This indicates that non-CEO executives with mixed ages weaken the positive relationship between the pay gap between executives and firm performance, which is consistent with hypothesis (H2).

<Insert Table 3.11 about here>

3.6 Conclusion

The motivation of this study is to examine whether the tournament theory is applicable to Chinese firms. Based on Lazear and Rosen (1981), executives aspiring for the position of CEO can be viewed as competing in a tournament. The prize in the rank order tournament induces these executives to expend effort to obtain the prize and to get promoted to the position of CEO. Using the comprehensive data of Chinese listed firms from 2005 to 2015, I find that the tournament prize, measured as the pay difference between the CEO and the median value of non-CEO executives, is associated with better firm performance.

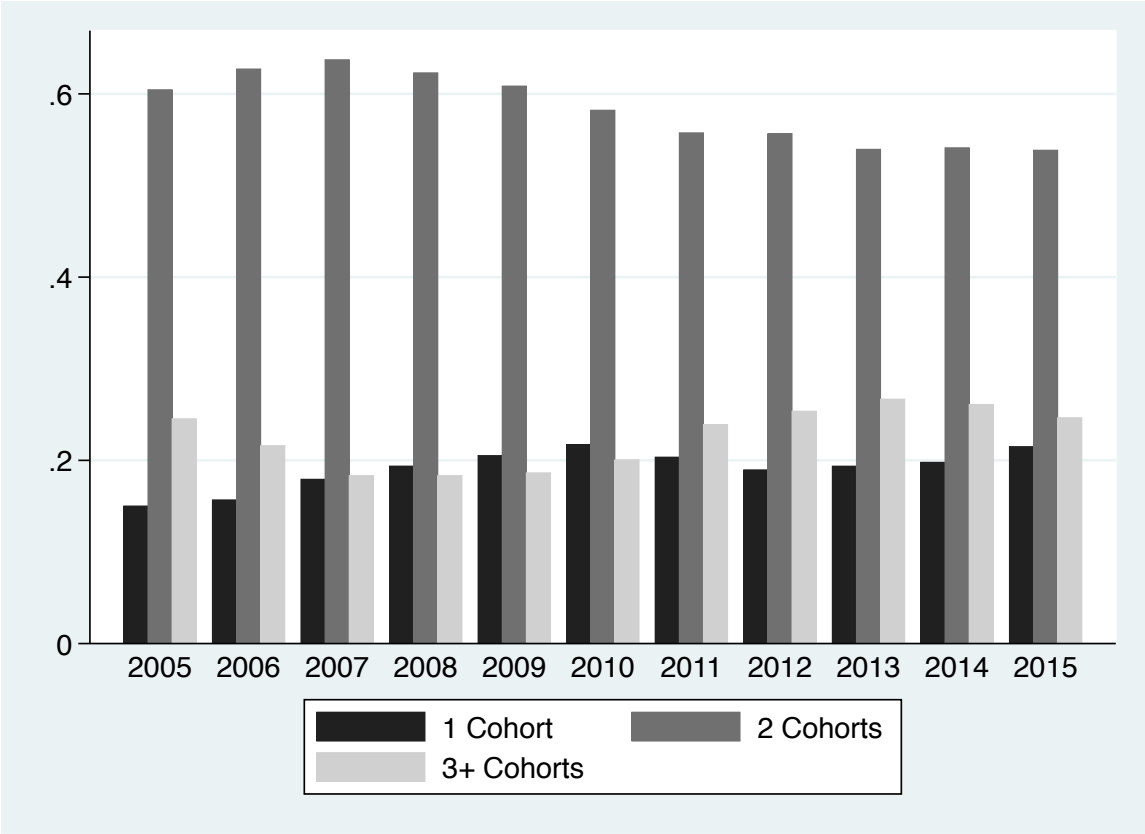
I then investigate the effectiveness of tournament incentives through the channel of non-CEO executives. The empirical findings show that the the tournament effects are affected by age heterogeneity of non-CEO executives. The tournament effect is weaker for firms in which the non-CEO executives come from different age cohorts. In Chinese society, senior people are highly valued because they are regarded as the locus of knowledge, power and authority. The presence of seniority reduces the incentives for younger executives to compete with senior executives. As a result, age heterogeneity among non-CEO executives weakens the tournament effect. However, the positive relationship between the pay gap and firm performance becomes stronger when the non-CEO executives are from the same age cohort. Non-CEO executives perceive a similar probability of promotion when facing similar-aged peers and therefore compete more fervently with them. In this way, the heightened peer competition motivates non-CEO executives to expend more effort and ultimately strengthen the tournament effect for this group. Overall, the characteristics of non-CEO executives plays an important role in determining the impact of tournament effects at Chinese firms.

The results remain robust following a variety of robustness checks. To address the endogeneity issue between CEO pay gap and firm performance, the fixed effect IV

approach and dynamic system GMM estimator are employed. With these two estimations, I obtain consistent results indicating that a larger CEO pay gap is associated with better firm performance. Further, I find that the impact of age heterogeneity on the tournament effect is more pronounced at state firms than at private firms, as the importance of seniority for promotion is overemphasized at state firms. I also use several alternative measures of pay gap, age heterogeneity of non-CEO executives and firm performance and I find similar levels of significance and results.

These findings provide useful guidance for Chinese policymakers, regulators and corporate decision makers concerning executive compensation. This study finds that the rank order tournament is an important incentive mechanism for motivating executives of Chinese firms. This study provides interdisciplinary evidence that the age composition among non-CEO executives is significant on its impact on firm performance. The findings contain implications that firms should consider adding executives with similar ages to their top team in order to lower the generation gap, and thereby increase firm performance.

Figure 3.1 Percentage of firms with non-CEO executive from different cohort composition



Source: CSMAR (2005-2015)

Notes: This figure reports the percentage of firms with non-CEO executives from different cohort composition in China from 2005 to 2015. In this study, executives are divided into four cohorts based on their birth year: 1926-1947 cohort, 1948-1958 cohort, 1959-1974 cohort and 1975-1992 cohort. 1 Cohort means that non-CEO executives are from the same cohorts. 2 Cohorts means that non-CEO executives come from any two different cohorts. 3+ Cohorts refers to that non-CEO executives are from any three or four cohorts.

Table 3.1 Descriptive Statistics

Var	Mean	Std	P25	Median	P75	N
Panel A: Firm performance						
ROA	0.05	0.05	0.03	0.05	0.08	18,885
ROE	0.08	0.11	0.03	0.08	0.13	18,897
EPS	0.36	0.46	0.09	0.27	0.54	18,898
Panel B: Tournament incentives (000s CNY)						
$Pay\ Gap_1$	196.60	509.07	40.00	102.00	220.85	18,898
$Pay\ Gap_2$	157.79	422.60	19.10	60.10	150.00	18,898
$Pay\ Gap_3$	187.38	477.80	36.30	103.64	214.95	18,898
Log (Pay Sd)	4.57	1.01	3.96	4.60	5.20	18,898
Panel C: Age difference in non-CEO executives						
1 Cohort	0.19	0.40	0.00	0.00	0.00	18,898
2 Cohorts	0.57	0.49	0.00	1.00	1.00	18,898
3+ Cohorts	0.23	0.42	0.00	0.00	0.00	18,898
Age Similarity (<20)	0.68	0.47	0.00	1.00	1.00	18,898
Log (Age Sd)	1.75	0.46	1.51	1.80	2.06	18,898
Panel D: Other characteristics						
State	0.11	0.20	0.00	0.00	0.14	18,898
Foreign	0.01	0.07	0.00	0.00	0.00	18,898
Private	0.10	0.18	0.00	0.00	0.12	18,898
Executives	6.98	2.75	5.00	7.00	8.00	18,898
Independent Director	0.37	0.05	0.33	0.33	0.40	18,898
Duality	0.21	0.41	0.00	0.00	0.00	18,898
Executive Age	46.48	3.66	44.00	46.50	49.00	18,898
CEO Age	47.92	6.46	44.00	48.00	52.00	18,898
Female Executive	0.14	0.15	0.00	0.13	0.22	18,898
Board Size	2.18	0.20	2.08	2.20	2.20	18,799
Leverage	0.45	0.21	0.28	0.45	0.61	18,898
Firm Size	21.80	1.29	20.91	21.63	22.46	18,898
List Age	8.95	5.98	3.60	8.52	13.69	18,898

Notes: This table reports descriptive statistics on key variables. The sample is an unbalanced panel covering18,898 firm-year observations between 2005 and 2015. All variables are defined in Appendix 3.1.

Table 3.2 Pay gap and firm performance

	Log ($Pay\ Gap_1$)			Log ($Pay\ Gap_2$)		
	ROA	ROE	EPS	ROA	ROE	EPS
	(1)	(2)	(3)	(4)	(5)	(6)
Log($Pay\ Gap_1$)	0.018***	0.043***	0.154*			
	(0.006)	(0.013)	(0.084)			
Log($Pay\ Gap_2$)				0.001***	0.002**	0.007**
				(0.000)	(0.001)	(0.003)
Duality	0.000	0.000	0.005	0.000	-0.002	-0.004
	(0.002)	(0.004)	(0.016)	(0.002)	(0.004)	(0.017)
Independent	-0.005	-0.014	-0.031	0.000	-0.000	0.079
Director	(0.014)	(0.032)	(0.130)	(0.015)	(0.033)	(0.122)
State	0.019***	0.048***	0.106***	0.019***	0.047***	0.116***
	(0.003)	(0.008)	(0.035)	(0.003)	(0.008)	(0.038)
Private	0.014***	0.037***	0.120***	0.016***	0.040***	0.126***
	(0.003)	(0.007)	(0.029)	(0.004)	(0.008)	(0.030)
Foreign	0.007	0.015	0.019	0.010	0.021	0.021
	(0.010)	(0.021)	(0.080)	(0.010)	(0.021)	(0.081)
Female	-0.002	-0.008	-0.007	-0.002	-0.007	0.022
Executive	(0.005)	(0.012)	(0.045)	(0.006)	(0.012)	(0.045)
Board Size	-0.007	-0.020*	-0.073	-0.006	-0.014	-0.037
	(0.005)	(0.012)	(0.051)	(0.005)	(0.011)	(0.048)
CEO Age	-0.005	-0.011	-0.059	-0.006	-0.011	-0.056
	(0.006)	(0.012)	(0.046)	(0.006)	(0.013)	(0.049)
Executive Age	-0.006	-0.041	-0.074	-0.005	-0.037	-0.037
	(0.013)	(0.028)	(0.107)	(0.014)	(0.029)	(0.113)
Leverage	0.031***	0.109***	0.101**	0.033***	0.114***	0.118**
	(0.006)	(0.012)	(0.050)	(0.006)	(0.013)	(0.052)
List Age	-0.001	0.000	-0.054***	-0.001	-0.000	-0.057***
	(0.001)	(0.001)	(0.006)	(0.001)	(0.001)	(0.007)
Firm Size	-0.014***	-0.032***	-0.028*	-0.014***	-0.031***	-0.027*
	(0.002)	(0.004)	(0.015)	(0.002)	(0.004)	(0.016)
N	15269	15276	15276	13599	13606	13606
R2	0.066	0.067	0.051	0.067	0.066	0.050

Notes: The table presents the results of fixed effect regression of pay gap on firm performance. The sample period is from 2005 to 2015. The dependent variables are firm performance measured by *ROA, ROE* and *EPS*. Columns (1) to (3) present the results of *Log(Pay Gap$_1$),* measured by the compensation difference between CEO and the median value of the non-CEO executives. Columns (4) to (6) present the results of *Log(Gap2),* measured by the pay difference between highest paid executive and second highest paid executive. All the control variables are defined in Appendix 3.1. All the independent variables are one year lagged. Year dummies and constant are included into the estimation but not reported. The robust standard errors are reported in parentheses. *, **, *** indicate statistical significance level at 10%, 5%, and 1%, respectively.

Table 3.3 Age heterogeneity, pay gap and firm performance

	Log ($Pay\ Gap_1$)			Log ($Pay\ Gap_2$)		
	ROA	ROE	EPS	ROA	ROE	EPS
	(1)	(2)	(3)	(4)	(5)	(6)
Log ($Pay\ Gap_1$)	0.052***	0.127***	0.462***			
	(0.011)	(0.028)	(0.129)			
Log ($Pay\ Gap_2$)				0.002***	0.005***	0.016***
				(0.001)	(0.001)	(0.006)
2 Cohorts	0.286***	0.690***	2.052*	0.003	0.011	0.022
	(0.093)	(0.229)	(1.055)	(0.004)	(0.008)	(0.031)
3+ Cohorts	0.404***	0.971***	4.325***	0.010**	0.025***	0.079**
	(0.097)	(0.249)	(1.426)	(0.004)	(0.009)	(0.037)
Interaction of Log (Pay Gap) with						
2 Cohorts	-0.036***	-0.086***	-0.257*	-0.001	-0.002	-0.006
	(0.012)	(0.029)	(0.132)	(0.001)	(0.002)	(0.007)
3+ Cohorts	-0.051***	-0.122***	-0.543***	-0.002***	-0.006***	-0.022***
	(0.012)	(0.031)	(0.179)	(0.001)	(0.002)	(0.008)
Reported controls						
Executive age	-0.008	-0.046	-0.081	-0.006	-0.040	-0.034
	(0.013)	(0.028)	(0.107)	(0.014)	(0.030)	(0.114)
Duality	0.001	0.000	0.005	-0.000	-0.002	-0.006
	(0.002)	(0.004)	(0.016)	(0.002)	(0.004)	(0.017)
Independent	-0.003	-0.011	-0.020	0.001	0.001	0.086
Director	(0.014)	(0.032)	(0.130)	(0.015)	(0.033)	(0.122)
State	0.019***	0.048***	0.108***	0.019***	0.048***	0.118***
	(0.003)	(0.008)	(0.035)	(0.003)	(0.008)	(0.038)
Private	0.014***	0.037***	0.122***	0.016***	0.040***	0.125***
	(0.003)	(0.007)	(0.029)	(0.004)	(0.008)	(0.030)
Foreign	0.007	0.015	0.018	0.010	0.021	0.021
	(0.010)	(0.021)	(0.080)	(0.010)	(0.021)	(0.081)
Female	-0.002	-0.009	-0.011	-0.002	-0.007	0.021
Executive	(0.005)	(0.012)	(0.045)	(0.006)	(0.012)	(0.045)
Board Size	-0.007	-0.019*	-0.073	-0.006	-0.014	-0.037
	(0.005)	(0.012)	(0.051)	(0.005)	(0.011)	(0.048)
CEO Age	-0.005	-0.010	-0.060	-0.006	-0.012	-0.063
	(0.006)	(0.012)	(0.046)	(0.006)	(0.013)	(0.049)
Leverage	0.031***	0.110***	0.103**	0.033***	0.114***	0.120**
	(0.006)	(0.012)	(0.050)	(0.006)	(0.013)	(0.052)
List Age	-0.001	0.000	-0.054***	-0.001	-0.000	-0.058***
	(0.001)	(0.001)	(0.006)	(0.001)	(0.001)	(0.007)
Firm Size	-0.014***	-0.033***	-0.031**	-0.014***	-0.032***	-0.028*
	(0.002)	(0.004)	(0.015)	(0.002)	(0.004)	(0.016)
N	15269	15276	15276	13599	13606	13606
R2	0.068	0.068	0.054	0.068	0.067	0.051

Notes: The table presents the results of age heterogeneity and pay gap on firm performance. Firm performance is measured by *ROA, ROE* and *EPS*. Columns (1) to (3) present the results of *Log (Pay* Gap_1*)*. The interaction terms represent the interaction of *Log (Pay* Gap_1*)* with *2 Cohorts* and *3+ Cohorts*. *2 Cohorts* equals one if the non-CEO executives come from any two different cohorts (generations) and zero otherwise. *3+ Cohorts* equals one if the non-CEO executives come from any three or four different cohorts (generations) and zero otherwise. Columns (4) to (6) present the results of *Log (Pay* Gap_2*)*. The interaction terms represent the interaction of *Log (Pay* Gap_1*)* with *2 Cohorts* and *3+ Cohorts*. All the control variables are defined in Appendix 3.1. All the independent variables are one year lagged. Year dummies and constant are included into the estimation but not reported. The robust standard errors are reported in parentheses. *, **, *** indicate statistical significance level at 10%, 5%, and 1%, respectively.

Table 3.4 Age heterogeneity, pay gap and firm performance (1/3+ Cohorts)

	1 Cohort			3+ Cohorts		
	ROA	ROE	EPS	ROA	ROE	EPS
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: $Pay\ Gap_1$ is the pay gap measure						
Log($Pay\ Gap_1$)	0.012*	0.029**	0.106	0.027***	0.062***	0.189**
	(0.006)	(0.013)	(0.087)	(0.009)	(0.019)	(0.093)
1 Cohort	-0.317***	-0.772***	-2.720**			
	(0.090)	(0.228)	(1.091)			
3+ Cohorts				0.248**	0.405*	1.053
				(0.114)	(0.237)	(0.985)
Interaction of Log (Pay Gap) with						
1 Cohort	0.040***	0.097***	0.341**			
	(0.011)	(0.029)	(0.137)			
3+ Cohorts				-0.031**	-0.051*	-0.133
				(0.014)	(0.030)	(0.124)
N	15269	15276	15276	15,271	15,278	15,278
R2	0.067	0.068	0.052	0.067	0.067	0.053
Panel B: $Pay\ Gap_2$ is the pay gap measure						
Log($Pay\ Gap_2$)	0.001**	0.001	0.005	0.001***	0.003***	0.011***
	(0.000)	(0.001)	(0.004)	(0.000)	(0.001)	(0.004)
1 Cohort	-0.005	-0.015*	-0.038			
	(0.003)	(0.008)	(0.030)			
3+ Cohorts				0.007**	0.016**	0.062**
				(0.003)	(0.006)	(0.029)
Interaction of Log (Pay Gap) with						
1 Cohort	0.001	0.003**	0.010			
	(0.001)	(0.002)	(0.007)			
3+ Cohorts				-0.002***	-0.004***	-0.017***
				(0.001)	(0.001)	(0.007)
N	13,599	13,606	13,606	13,599	13,606	13,606
R2	0.067	0.066	0.050	0.068	0.067	0.051

Notes: The table presents the results of pay gap on firm performance with interaction terms. The sample period is from 2005 to 2015. The dependent variables are firm performance measured by *ROA, ROE* and *EPS*. In Panel A, the tournament incentive is measured by *Log ($Pay\ Gap_1$),* measured by the compensation difference between CEO and the median value of the non-CEO executives. In Panel B, he tournament incentive is measured by *Log ($Pay\ Gap_2$),* measured by the compensation difference between highest paid executives and second highest paid executives. Columns (1) to (3) present the results of the interaction of *Log ($Pay\ Gap_1$)* with *1 Cohort*. *1 Cohort* equals one if the non-CEO executives come from one cohort (generation) and zero otherwise. Columns (4) to (6) present the results of the interaction of *Log($Pay\ Gap_1$)* with *3+ Cohorts*. *3+ Cohorts* equals one if the non-CEO executives come from one cohort (generation) and zero otherwise. All the control variables are defined in Appendix 3.1. All the independent variables are one year lagged. Year dummies and constant are included into the estimation but not reported. The robust standard errors are reported in parentheses. *, **, *** indicate statistical significance level at 10%, 5%, and 1%, respectively.

Table 3.5 Age diversity, pay gap and firm performance (subgroup: state-owned vs non-state-owned)

	State firms			Private firms		
	ROA	ROE	EPS	ROA	ROE	EPS
	(1)	(2)	(3)	(4)	(5)	(6)
Log($Pay\ Gap_1$)	0.097***	0.195***	0.695**	0.033***	0.082***	0.229*
	(0.029)	(0.064)	(0.282)	(0.013)	(0.028)	(0.117)
2 Cohorts	0.511**	0.870	3.166	0.191*	0.464**	0.573
	(0.249)	(0.605)	(2.558)	(0.105)	(0.234)	(0.956)
3+ Cohorts	0.619**	1.248**	5.794**	0.269**	0.514**	0.862
	(0.242)	(0.557)	(2.499)	(0.114)	(0.261)	(1.123)
Interaction of Log (Pay Gap) with						
2 Cohorts	-0.065**	-0.111	-0.398	-0.024*	-0.057*	-0.071
	(0.031)	(0.076)	(0.322)	(0.013)	(0.029)	(0.120)
3+ Cohorts	-0.079***	-0.158**	-0.727**	-0.033**	-0.064*	-0.109
	(0.030)	(0.070)	(0.314)	(0.014)	(0.033)	(0.141)
Reported controls						
Executive age	-0.000	-0.088	-0.078	0.002	-0.009	-0.014
	(0.024)	(0.060)	(0.217)	(0.013)	(0.033)	(0.097)
Duality	-0.005	-0.017	-0.056	0.001	-0.001	0.015
	(0.005)	(0.012)	(0.040)	(0.002)	(0.006)	(0.017)
Independent	0.018	0.048	-0.028	-0.000	0.004	0.034
Director	(0.027)	(0.073)	(0.286)	(0.018)	(0.046)	(0.132)
State	0.018**	0.045**	0.140*	0.017***	0.051***	0.111***
	(0.008)	(0.020)	(0.084)	(0.004)	(0.011)	(0.035)
Private	0.019*	0.039	0.045	0.013***	0.035***	0.120***
	(0.010)	(0.026)	(0.092)	(0.004)	(0.009)	(0.030)
Foreign	-0.078**	-0.171*	-0.389	0.001	0.000	-0.048
	(0.036)	(0.101)	(0.516)	(0.010)	(0.024)	(0.076)
Female	0.009	0.007	-0.007	-0.005	-0.014	-0.014
Executive	(0.011)	(0.031)	(0.103)	(0.006)	(0.014)	(0.041)
Board Size	-0.012	-0.044	-0.262**	-0.006	-0.015	-0.046
	(0.011)	(0.031)	(0.117)	(0.006)	(0.016)	(0.047)
CEO Age	0.010	0.028	-0.019	0.002	0.017	-0.039
	(0.012)	(0.030)	(0.112)	(0.006)	(0.016)	(0.044)
Leverage	0.029**	0.064**	0.125	0.039***	0.112***	0.142***
	(0.011)	(0.032)	(0.103)	(0.007)	(0.020)	(0.054)
List Age	-0.001	-0.000	-0.035**	-0.002*	-0.002	-0.066***
	(0.002)	(0.004)	(0.015)	(0.001)	(0.002)	(0.007)
Firm Size	-0.015***	-0.031***	-0.072**	-0.013***	-0.027***	-0.024
	(0.003)	(0.008)	(0.028)	(0.002)	(0.006)	(0.018)
N	3,842	3,842	3,842	11,606	11,606	11,606
R2	0.066	0.051	0.054	0.067	0.053	0.067

Notes: The table presents the results of fixed effect regression of pay gap on firm performance with interaction terms for state firms and private firms. The sample period is from 2005 to 2015. The dependent variables are firm performance measured by *ROA, ROE* and *EPS*. Columns (1) to (3) present the results of *state firms),* The interaction terms represent the interaction of *Log(*$Pay\ Gap_1$*)* with *2 Cohorts* and *3+ Cohorts*. *2 Cohorts* equals one if the non-CEO executives come from any two different cohorts (generations) and zero otherwise. *3+ Cohorts* equals one if the non-CEO executives come from any three or four different cohorts (generations) and zero otherwise. Columns (4) to (6) present the results of *private firms.* The interaction terms represent the interaction of *Log (*$Pay\ Gap_1$*)* with *2 Cohorts* and *3+ Cohorts*. All the control variables are defined in Appendix 3.1. All the independent variables are one year lagged. Year dummies and constant are included into the estimation but not reported. The robust standard errors are reported in parentheses. *, **, *** indicate statistical significance level at 10%, 5%, and 1%, respectively.

Table 3.6a Age heterogeneity, pay gap and performance (Fe instrument variable approach: first stage)

	$Pay\ Gap_1$	$Pay\ Gap_1$* 2 Cohorts	$Pay\ Gap_1$* 3 Cohorts	$Pay\ Gap_2$	$Pay\ Gap_2$* 2 Cohorts	$Pay\ Gap_2$* 3 Cohorts
2 Cohorts	1.111***	7.342***	-0.008	-0.010	3.947***	0.102
	(0.248)	(0.220)	(0.168)	(0.227)	(0.190)	(0.131)
3+ Cohorts	0.133	-0.858***	7.263***	-0.163	0.322	3.551***
	(0.276)	(0.244)	(0.187)	(0.295)	(0.246)	(0.170)
Executive age	-0.066***	-0.033*	-0.025*	0.243	0.373	-0.311
	(0.020)	(0.018)	(0.013)	(0.346)	(0.290)	(0.200)
Duality	0.007**	0.001	0.003	0.192***	0.038	0.068**
	(0.003)	(0.003)	(0.002)	(0.052)	(0.043)	(0.030)
Independent Director	-0.013	-0.018	0.023	0.286	0.133	0.369*
	(0.022)	(0.019)	(0.015)	(0.379)	(0.317)	(0.219)
State	0.017***	0.012**	0.005	0.016	-0.041	0.044
	(0.006)	(0.005)	(0.004)	(0.100)	(0.083)	(0.057)
Private	0.002	-0.004	0.007*	-0.093	0.016	-0.071
	(0.006)	(0.005)	(0.004)	(0.102)	(0.086)	(0.059)
Foreign	0.009	0.009	-0.000	-0.008	0.032	-0.057
	(0.008)	(0.007)	(0.005)	(0.132)	(0.110)	(0.076)
Female Executive	0.067***	0.043***	0.016**	0.048	0.204	-0.208**
	(0.009)	(0.008)	(0.006)	(0.158)	(0.132)	(0.091)
Board Size	-0.015	0.005	-0.017	0.005	-0.066	0.085
	(0.017)	(0.015)	(0.011)	(0.289)	(0.242)	(0.167)
CEO Age	0.038***	0.032***	-0.001	0.145	0.066	-0.020
	(0.009)	(0.008)	(0.006)	(0.154)	(0.129)	(0.089)
Leverage	-0.029***	-0.015**	-0.007	-0.433***	-0.253**	-0.004
	(0.009)	(0.008)	(0.006)	(0.147)	(0.123)	(0.085)
List Age	-0.007***	-0.003***	-0.003***	-0.022	0.008	-0.044***
	(0.001)	(0.001)	(0.001)	(0.024)	(0.020)	(0.014)
Firm Size	0.019***	0.012***	-0.000	0.259***	0.135***	0.014
	(0.002)	(0.002)	(0.002)	(0.040)	(0.034)	(0.023)
Log($Pay\ Gap_1$)(Median Industry)	0.117***	-0.081***	-0.008			
	(0.028)	(0.025)	(0.019)			
New CEO	-0.024***	0.003	-0.001	-0.197**	0.083	0.014
	(0.004)	(0.004)	(0.003)	(0.078)	(0.065)	(0.045)
No. of non-CEO executives	-0.023***	-0.008	-0.002	-0.319***	-0.108	0.011
	(0.006)	(0.005)	(0.004)	(0.103)	(0.086)	(0.059)
Log($Pay\ Gap_1$)(Median Industry)* 2 Cohorts	-0.141***	0.078***	0.002			

	(0.031)	(0.028)	(0.021)			
Log($Pay\ Gap_1$)(Median Industry)* 3 Cohorts	-0.017	0.111***	0.086***			
	(0.035)	(0.031)	(0.024)			
No. of non-CEO executives* 2 Cohorts	0.010*	0.005	-0.002	0.052	-0.081	-0.043
	(0.006)	(0.006)	(0.004)	(0.109)	(0.091)	(0.063)
No. of non-CEO executives * 3 Cohorts	0.010	-0.016**	0.019***	0.180	-0.156	0.178**
	(0.008)	(0.007)	(0.005)	(0.137)	(0.115)	(0.079)
New CEO * 2 Cohorts	-0.006	-0.037***	0.002	0.184**	-0.134*	-0.001
	(0.005)	(0.004)	(0.003)	(0.088)	(0.074)	(0.051)
New CEO * 3 Cohorts	-0.007	0.001	-0.037***	0.272***	-0.049	0.003
	(0.006)	(0.005)	(0.004)	(0.101)	(0.085)	(0.058)
Log($Pay\ Gap_2$)(Median Industry)				0.022*	-0.059***	-0.010
				(0.027)	(0.023)	(0.016)
Log($Pay\ Gap_2$)(Median Industry)* 2 Cohorts				-0.006	0.107***	-0.004
				(0.031)	(0.026)	(0.018)
Log($Pay\ Gap_2$)(Median Industry)* 3 Cohorts				-0.026	-0.002	0.077***
				(0.035)	(0.030)	(0.020)
N	12,664	12,664	12,664	10,868	10,868	10,868

Notes: The table presents the results of impact of age heterogeneity on the relationship between pay gap on firm performance using the fixed effect instrument variable approach (first stage). The dependent variables are firm performance measured by *ROA, ROE* and *EPS* in columns (1) to (3). Columns (1) to (3) present the results of *Log (*$Pay\ Gap_1$*),* measured by the compensation difference between CEO and the median value of the non-CEO executives, and two interaction terms, namely *Log (*$Pay\ Gap_1$*)* 2 Cohorts* and *Log (*$Pay\ Gap_1$*)* 3 Cohorts.* Columns (4) to (6) present the results of *Log (*$Pay\ Gap_2$*),* measured by the measured by the pay difference between highest paid executive and second highest paid executive, and two interaction terms, namely *Log (*$Pay\ Gap_2$*)* 2 Cohorts* and *Log (*$Pay\ Gap_2$*)* 3 Cohorts.* Instrument variables for *Log (*$Pay\ Gap_1$*)* are the median value of compensation gap *(*$Pay\ Gap_1$) for the firm in the same industry and belongs to the same size quartile as the firm, the number of non-CEO executives (*Executives*) and a dummy variable (*New CEO*) that equals one if the CEO is a new CEO and zero otherwise. All the control variables are defined in Appendix A. All the control variables are defined in Appendix A. Year dummies and constant are included into the estimation but not reported. F-statistics reports the joint relevance of all instruments in the first stage. The robust errors are shown in parentheses. *, **, *** indicate statistical significance level at 10%, 5%, and 1%, respectively.

Table 3.6b Age heterogeneity, pay gap and performance (Fe instrument variable approach: second stage)

	Log($Pay\ Gap_1$)			Log($Pay\ Gap_2$)		
	ROA	ROE	EPS	ROA	ROE	EPS
	(1)	(2)	(3)	(4)	(5)	(6)
Log($Pay\ Gap_1$)	0.042***	0.117***	0.624***			
	(0.010)	(0.029)	(0.201)			
Log($Pay\ Gap_2$)				0.001*	0.004**	0.015**
				(0.001)	(0.002)	(0.007)
2 Cohorts	0.229***	0.598***	2.100	0.002	0.009	-0.001
	(0.086)	(0.230)	(1.652)	(0.003)	(0.008)	(0.037)
3+ Cohorts	0.314***	0.877***	6.800***	0.009**	0.024**	0.084**
	(0.097)	(0.267)	(2.410)	(0.004)	(0.010)	(0.043)
Interaction of Log (Pay Gap) with						
2 Cohorts	-0.029***	-0.075***	-0.263	-0.000	-0.002	-0.001
	(0.011)	(0.029)	(0.208)	(0.001)	(0.002)	(0.009)
3+ Cohorts	-0.039***	-0.109***	-0.853***	-0.002*	-0.005**	-0.022**
	(0.012)	(0.034)	(0.303)	(0.001)	(0.002)	(0.010)
Reported controls						
Executive age	-0.003	-0.040	-0.087	0.003	-0.026	-0.038
	(0.011)	(0.025)	(0.108)	(0.013)	(0.028)	(0.120)
Duality	0.002	0.001	0.007	0.002	0.001	0.005
	(0.002)	(0.004)	(0.017)	(0.002)	(0.004)	(0.018)
Independent	-0.000	-0.006	0.156	0.007	0.016	0.140
	(0.013)	(0.030)	(0.162)	(0.014)	(0.031)	(0.118)
State	0.016***	0.042***	0.063*	0.017***	0.043***	0.106***
	(0.003)	(0.007)	(0.037)	(0.003)	(0.008)	(0.036)
Private	0.012***	0.031***	0.107***	0.014***	0.035***	0.114***
	(0.003)	(0.007)	(0.030)	(0.003)	(0.007)	(0.033)
Foreign	-0.005	-0.015	-0.048	-0.004	-0.011	-0.006
	(0.005)	(0.010)	(0.046)	(0.005)	(0.011)	(0.045)
Female Executive	-0.002	-0.006	-0.061	-0.006	-0.014	-0.064
	(0.005)	(0.012)	(0.045)	(0.006)	(0.013)	(0.050)
Board Size	0.013	0.027	0.049	0.013	0.029	0.066
	(0.010)	(0.020)	(0.092)	(0.011)	(0.023)	(0.100)
CEO Age	-0.002	-0.005	0.022	-0.001	-0.007	0.024
	(0.005)	(0.011)	(0.044)	(0.005)	(0.012)	(0.046)
Leverage	0.037***	0.127***	0.120**	0.038***	0.126***	0.169***
	(0.006)	(0.013)	(0.061)	(0.006)	(0.013)	(0.063)
List Age	-0.001*	-0.000	-0.059***	-0.001**	-0.000	-0.063***
	(0.001)	(0.001)	(0.007)	(0.001)	(0.001)	(0.008)
Firm Size	-0.016***	-0.037***	-0.038**	-0.015***	-0.033***	-0.035**
	(0.002)	(0.004)	(0.017)	(0.002)	(0.004)	(0.018)
N	12657	12664	12664	10861	10868	10868
LR	0.000	0.000	0.000	0.000	0.000	0.000
Hansen	0.217	0.169	0.315	0.324	0.270	0.120

Notes: The table presents the results of impact of age heterogeneity on the relationship between pay gap on firm performance using the fixed effect instrument variable approach. The dependent variables are firm performance measured by *ROA, ROE* and *EPS* in columns (1) to (3). Columns (1) to (3) present the results of *Log (Pay Gap₁),* measured by the compensation difference between CEO and the median value of the non-CEO executives.

Instrument variables for *Log ((Pay* Gap_1*)* are the median value of compensation gap (*(Pay* Gap_1) for the firm in the same industry and belongs to the same size quartile as the firm, the number of non-CEO executives (*Executives*) and a dummy variable (*New CEO*) that equals one if the CEO is a new CEO and zero otherwise. Columns (4) to (6) present the results of *Log (Pay* Gap_2*),* measured by the pay difference between highest paid executive and second highest paid executive. Instrument variables for *Log (Pay* Gap_2*)* are the median value of compensation gap (*Pay* Gap_2) for the firm in the same industry and belongs to the same size quartile as the firm, the number of non-CEO executives (*Executives*) and a dummy variable (*New CEO*) that equals one if the CEO is a new CEO and zero otherwise. All the control variables are defined in Appendix A. All the control variables are defined in Appendix A. All the independent variables are one year lagged. Year dummies and constant are included into the estimation but not reported. The robust errors are shown in parentheses. LM is the p-value of LM underidentification test. Hansen J is the p-value of Hansen's J test of overidentifying restrictions. *, **, *** indicate statistical significance level at 10%, 5%, and 1%, respectively.

Table 3.7 Age heterogeneity, pay gap and firm performance (System GMM)

	Log ($Pay\ Gap_1$)			Log ($Pay\ Gap_2$)		
	ROA	ROE	EPS	ROA	ROE	EPS
	(1)	(2)	(3)	(4)	(5)	(6)
L.ROA	0.385***			0.362***		
	(0.024)			(0.026)		
L.ROE		0.320***			0.310***	
		(0.023)			(0.026)	
L.EPS			0.584***			0.557***
			(0.030)			(0.032)
Log((Pay Gap_1)	0.511***	0.830***	2.964**			
	(0.132)	(0.269)	(1.183)			
Log((Pay Gap_2)				0.009	0.031**	0.116***
				(0.006)	(0.014)	(0.043)
2 Cohorts	4.341***	6.661***	24.473**	0.022	0.095	0.456**
	(1.243)	(2.532)	(10.520)	(0.028)	(0.069)	(0.218)
3+ Cohorts	4.497***	6.669***	23.904**	0.031	0.168**	0.701***
	(1.150)	(2.409)	(10.868)	(0.033)	(0.078)	(0.246)
Interaction of Log (Pay Gap) with						
2 Cohorts	-0.543***	-0.831***	-3.064**	-0.004	-0.019	-0.092*
	(0.156)	(0.318)	(1.319)	(0.006)	(0.016)	(0.050)
3+ Cohorts	-0.562***	-0.832***	-2.990**	-0.006	-0.035**	-0.150***
	(0.144)	(0.302)	(1.362)	(0.007)	(0.017)	(0.055)
Reported controls						
Executive Age	0.054	0.100	0.390	0.037	0.062	0.340
	(0.043)	(0.091)	(0.310)	(0.042)	(0.095)	(0.334)
Duality	-0.011	-0.019	-0.060	0.001	0.010	-0.008
	(0.007)	(0.016)	(0.052)	(0.007)	(0.014)	(0.047)
Independent	0.008	0.004	0.333	0.005	-0.052	0.104
Director	(0.065)	(0.130)	(0.473)	(0.059)	(0.128)	(0.434)
State	-0.009	-0.024	0.002	-0.009	-0.025	-0.044
	(0.007)	(0.015)	(0.054)	(0.007)	(0.017)	(0.063)
Private	-0.005	0.005	0.037	-0.009	-0.007	-0.014
	(0.006)	(0.012)	(0.052)	(0.007)	(0.014)	(0.054)
Foreign	-0.008	-0.017	-0.014	-0.012	-0.019	-0.014
	(0.013)	(0.027)	(0.095)	(0.014)	(0.026)	(0.100)
Female Executive	0.019	0.011	0.059	-0.002	-0.034	-0.068
	(0.017)	(0.036)	(0.116)	(0.017)	(0.036)	(0.121)
Board Size	0.016	-0.004	0.015	0.019	0.013	0.050
	(0.020)	(0.045)	(0.158)	(0.019)	(0.041)	(0.150)
CEO Age	0.035**	0.093**	0.118	0.023	0.069*	0.071
	(0.017)	(0.038)	(0.125)	(0.018)	(0.040)	(0.136)
Leverage	0.009	0.009	-0.107	0.007	0.001	-0.027
	(0.014)	(0.030)	(0.108)	(0.015)	(0.031)	(0.122)
List Age	-0.000	-0.003	-0.008	0.001	0.005	0.005
	(0.002)	(0.004)	(0.013)	(0.002)	(0.004)	(0.014)
Firm Size	-0.011**	-0.012	0.018	-0.009*	-0.014	-0.000
	(0.005)	(0.009)	(0.030)	(0.005)	(0.009)	(0.032)

AR(2)	0.825	0.379	0.349	0.844	0.403	0.109
Hansen P-value	0.000	0.000	0.000	0.000	0.000	0.000
N	15288	15299	15300	13684	13695	13696

Notes: The table presents the system GMM results of impact of age heterogeneity on the relationship between pay gap on firm performance. The sample period is from 2005 to 2015. The dependent variables are firm performance measured by *ROA, ROE* and *EPS*. Columns (1) to (3) present the results of *Log (Pay* Gap_1*),* measured by the compensation difference between CEO and the median value of the non-CEO executives. Columns (4) to (6) present the results of *Log (Pay* Gap_2*),* measured by the pay difference between highest paid executive and second highest paid executive. The GMM style variables are the respective dependent variables as well as Duality, Independent Director, State, Private, Foreign, Female Executive, Board Size, Executive, Leverage, Listed, Firm Size. The IV style variables are year dummies. AR (2) is test for the second order serial correlation. The Hansen test of over-identification is based on the null that all instruments are valid. Constant is included into the estimation but not reported. The robust standard errors are reported in parentheses. *, **, *** indicate statistical significance level at 10%, 5% and 1%, respectively.

Table 3.8 Pay gap and firm performance (Robustness)

	Log ($Pay\ Gap_3$)			Log ($Pay\ SD$)		
	ROA	ROE	EPS	ROA	ROE	EPS
	(1)	(2)	(3)	(4)	(5)	(6)
Log($Pay\ Gap_3$)	0.016***	0.039***	0.138			
	(0.006)	(0.014)	(0.089)			
Log($Pay\ SD$)				0.004***	0.009***	0.041***
				(0.001)	(0.002)	(0.008)
Duality	0.000	-0.000	0.005	0.001	0.001	0.010
	(0.002)	(0.004)	(0.016)	(0.002)	(0.004)	(0.016)
Independent	-0.005	-0.015	-0.031	-0.007	-0.020	-0.054
Director	(0.014)	(0.032)	(0.130)	(0.014)	(0.032)	(0.129)
State	0.019***	0.048***	0.107***	0.019***	0.048***	0.108***
	(0.003)	(0.008)	(0.035)	(0.003)	(0.008)	(0.035)
Private	0.014***	0.037***	0.120***	0.014***	0.037***	0.119***
	(0.003)	(0.007)	(0.029)	(0.003)	(0.007)	(0.029)
Foreign	0.006	0.015	0.018	0.005	0.012	0.004
	(0.010)	(0.021)	(0.080)	(0.010)	(0.021)	(0.080)
Female	-0.003	-0.008	-0.004	-0.003	-0.008	-0.006
Executive	(0.005)	(0.012)	(0.045)	(0.005)	(0.012)	(0.045)
Board Size	-0.007	-0.020*	-0.074	-0.007	-0.021*	-0.077
	(0.005)	(0.012)	(0.051)	(0.005)	(0.012)	(0.051)
CEO Age	-0.005	-0.010	-0.057	-0.004	-0.009	-0.054
	(0.006)	(0.012)	(0.046)	(0.005)	(0.012)	(0.045)
Executive Age	-0.007	-0.041	-0.073	-0.008	-0.043	-0.080
	(0.013)	(0.028)	(0.107)	(0.013)	(0.028)	(0.106)
Leverage	0.030***	0.109***	0.102**	0.031***	0.111***	0.112**
	(0.006)	(0.012)	(0.049)	(0.006)	(0.012)	(0.049)
List Age	-0.001	0.000	-0.054***	-0.001	0.000	-0.055***
	(0.001)	(0.001)	(0.006)	(0.001)	(0.001)	(0.007)
Firm Size	-0.013***	-0.032***	-0.028*	-0.014***	-0.033***	-0.035**
	(0.002)	(0.004)	(0.015)	(0.002)	(0.004)	(0.015)
N	15,269	15,276	15,276	15,269	15,276	15,276
R2	0.066	0.066	0.051	0.068	0.068	0.055

Notes: The table presents the robust results of pay gap on firm performance. The sample period is from 2005 to 2015. The dependent variables are firm performance measured by *ROA, ROE* and *EPS*. Columns (1) to (3) present the results of *Log (Pay Sd),* measured by the logarithm of the standard deviation of executives' compensation. Columns (4) to (6) present the results of *Log (*$Pay\ Gap_3$*),* measured by the pay difference between CEO and mean value of non-CEO executive. All the control variables are defined in Appendix 3.1. All the independent variables are one year lagged. Year dummies and constant are included into the estimation but not reported. The robust standard errors are reported in parentheses. *, **, *** indicate statistical significance level at 10%, 5%, and 1%, respectively.

Table 3.9 Age heterogeneity, pay gap and firm performance: robustness (age similarity)

	Log($Pay\ Gap_1$)			Log($Pay\ Gap_2$)		
	ROA	ROE	EPS	ROA	ROE	EPS
Log($Pay\ Gap_1$)	0.008	0.024	0.060			
	(0.008)	(0.016)	(0.121)			
Log($Pay\ Gap_2$)				0.000	-0.000	-0.001
				(0.001)	(0.001)	(0.005)
Age Similarity (<20)	-0.134**	-0.267*	-1.311	-0.003	-0.011*	-0.032
	(0.067)	(0.142)	(0.909)	(0.003)	(0.006)	(0.027)
Interaction of Log (Pay Gap) with						
Age Similarity (<20)	0.017**	0.033*	0.165	0.001*	0.003**	0.012*
	(0.008)	(0.018)	(0.114)	(0.001)	(0.001)	(0.006)
Reported controls						
Executive Age	-0.006	-0.042	-0.066	-0.003	-0.035	-0.017
	(0.013)	(0.028)	(0.108)	(0.014)	(0.030)	(0.114)
Duality	0.000	0.000	0.004	-0.000	-0.002	-0.006
	(0.002)	(0.004)	(0.016)	(0.002)	(0.004)	(0.017)
Independent	-0.005	-0.014	-0.030	0.001	0.001	0.083
Director	(0.014)	(0.032)	(0.130)	(0.015)	(0.033)	(0.122)
State	0.019***	0.048***	0.107***	0.019***	0.048***	0.118***
	(0.003)	(0.008)	(0.035)	(0.003)	(0.008)	(0.038)
Private	0.014***	0.037***	0.119***	0.016***	0.039***	0.124***
	(0.003)	(0.007)	(0.029)	(0.004)	(0.008)	(0.030)
Foreign	0.007	0.015	0.022	0.010	0.022	0.023
	(0.010)	(0.021)	(0.079)	(0.010)	(0.021)	(0.081)
Female Executive	-0.002	-0.008	-0.009	-0.002	-0.007	0.022
	(0.005)	(0.012)	(0.045)	(0.006)	(0.012)	(0.045)
Board Size	-0.007	-0.020*	-0.074	-0.006	-0.014	-0.038
	(0.005)	(0.012)	(0.051)	(0.005)	(0.011)	(0.048)
CEO Age	-0.005	-0.010	-0.060	-0.007	-0.012	-0.064
	(0.006)	(0.012)	(0.046)	(0.006)	(0.013)	(0.049)
Leverage	0.031***	0.110***	0.103**	0.033***	0.114***	0.120**
	(0.006)	(0.012)	(0.050)	(0.006)	(0.013)	(0.052)
List Age	-0.001	0.000	-0.054***	-0.001	-0.000	-0.058***
	(0.001)	(0.001)	(0.006)	(0.001)	(0.001)	(0.007)
Firm Size	-0.014***	-0.032***	-0.029*	-0.014***	-0.031***	-0.027*
	(0.002)	(0.004)	(0.015)	(0.002)	(0.004)	(0.016)
N	15,269	15,276	15,276	13599	13606	13606
R2	0.067	0.067	0.052	0.067	0.067	0.051

Notes: The table presents the robust results of pay gap on firm performance with interaction terms. The sample period is from 2005 to 2015. The dependent variables are firm performance measured by *ROA, ROE* and *EPS*. The left panel presents the results of *Log(*$Pay\ Gap_1$*),* measured by the compensation difference between CEO and the median value of the non-CEO executives. The interaction terms represent the interaction of *Log (*$Pay\ Gap_1$*)* with *Age Similarity (<20)*. *Age Similarity (< 20)* is a dummy variable which equals one if the age spread between the non-CEO executives are less than 20 years. The right panel presents the results of *Log(*$Pay\ Gap_2$*),* measured by the pay difference between highest paid executive and second highest paid executive. The interaction terms represent the interaction of *Log(*$Pay\ Gap_1$*)* with *Age Similarity (<20)*. All the control variables are defined in Appendix 3.1. All the independent variables are one year lagged. Year dummies and constant are included into the estimation but not reported. The robust standard errors are reported in parentheses. *, **, *** indicate statistical significance level at 10%, 5%, and 1%, respectively.

Table 3.10 Age heterogeneity, pay gap and firm performance: robustness(SD)

	Log($Pay\ Gap_1$)			Log($Pay\ Gap_2$)		
	ROA	ROE	EPS	ROA	ROE	EPS
	(1)	(2)	(3)	(4)	(5)	(6)
Log($Pay\ Gap_1$)	0.058***	0.137***	0.539**			
	(0.020)	(0.044)	(0.238)			
Log($Pay\ Gap_2$)				0.003**	0.007***	0.025**
				(0.001)	(0.003)	(0.011)
Log (Age Sd)	0.185**	0.431**	1.733	0.004	0.016**	0.045*
	(0.083)	(0.186)	(1.068)	(0.003)	(0.007)	(0.027)
Interaction of Log (Gap) with						
Log (Age Sd)	-0.023**	-0.053**	-0.216	-0.001	-0.003**	-0.010*
	(0.010)	(0.023)	(0.134)	(0.001)	(0.001)	(0.006)
Reported controls						
Executive Age	-0.007	-0.048*	-0.088	-0.003	-0.039	-0.035
	(0.013)	(0.029)	(0.109)	(0.014)	(0.030)	(0.115)
Duality	0.001	0.001	0.006	-0.000	-0.001	-0.005
	(0.002)	(0.004)	(0.016)	(0.002)	(0.004)	(0.017)
Independent	-0.004	-0.013	-0.029	0.001	0.001	0.084
Director	(0.014)	(0.032)	(0.130)	(0.015)	(0.033)	(0.122)
State	0.019***	0.048***	0.107***	0.019***	0.047***	0.117***
	(0.003)	(0.008)	(0.035)	(0.003)	(0.008)	(0.038)
Private	0.014***	0.037***	0.119***	0.016***	0.039***	0.125***
	(0.003)	(0.007)	(0.029)	(0.004)	(0.008)	(0.030)
Foreign	0.007	0.016	0.022	0.010	0.022	0.022
	(0.010)	(0.021)	(0.080)	(0.010)	(0.021)	(0.081)
Female	-0.002	-0.008	-0.007	-0.002	-0.007	0.022
Executive	(0.005)	(0.012)	(0.045)	(0.006)	(0.012)	(0.045)
Board Size	-0.007	-0.020*	-0.072	-0.006	-0.014	-0.036
	(0.005)	(0.012)	(0.052)	(0.005)	(0.011)	(0.049)
CEO Age	-0.005	-0.008	-0.054	-0.006	-0.010	-0.057
	(0.006)	(0.012)	(0.046)	(0.006)	(0.013)	(0.050)
Leverage	0.031***	0.110***	0.102**	0.033***	0.114***	0.120**
	(0.006)	(0.012)	(0.050)	(0.006)	(0.013)	(0.052)
List Age	-0.001	0.000	-0.054***	-0.001	-0.000	-0.057***
	(0.001)	(0.001)	(0.006)	(0.001)	(0.001)	(0.007)
Firm Size	-0.014***	-0.032***	-0.029*	-0.014***	-0.032***	-0.028*
	(0.002)	(0.004)	(0.015)	(0.002)	(0.004)	(0.016)
N	15264	15271	15271	13594	13601	13601
R2	0.067	0.067	0.052	0.067	0.067	0.050

Notes: The table presents the robust results of pay gap on firm performance with interaction terms. The sample period is from 2005 to 2015. The dependent variables are firm performance measured by *ROA, ROE* and *EPS*. Columns (1) to (3) present the results of *Log (Pay Gap$_1$),* measured by the compensation difference between CEO and the median value of the non-CEO executives. Columns (4) to (6) present the results of *Log (Pay Gap$_2$),* measured by the compensation difference between highest and second highest non-CEO executives. The interaction terms represent the interaction of *Log (Pay Gap$_1$)* with *Log (Age Sd),* measured as the logarithm of the standard deviation of executives' ages. The right panel presents the results of *Log(Pay Gap$_2$),* measured by the pay difference between highest paid executive and second highest paid executive. The interaction terms represent the interaction of *Log(Pay Gap$_2$)* with *Log (Age Sd)*. All the control variables are defined in Appendix 3.1. the independent variables are one year lagged. Year dummies and constant are included into the estimation but not reported. The robust standard errors are reported in parentheses. *, **, *** indicate statistical significance level at 10%, 5%, and 1%, respectively.

Appendix 3.1 Variables definition

Variable	Definition
Panel A: Firm performance	
ROA	Net income/ total assets
ROE	Net income/ book value of total equity
EPS	(Net income - dividends on preferred stock)/average outstanding shares
Panel B: Tournament incentives (000s CNY)	
$Pay\ Gap_1$	Compensation of CEO - median value of compensation of non-CEO executives
$Pay\ Gap_2$	Compensation of highest paid executive- compensation of second highest paid executive
$Pay\ Gap_3$	Compensation of CEO - mean value of compensation of non-CEO executives
Log (Pay Sd)	Log of standard deviation of executives' compensation
Panel C: Age difference in non-CEO executives	
1 Cohort	Dummy variable equals 1 if non-CEO executives come from the same cohort (generation) and 0 otherwise
2 Cohorts	Dummy variable equals 1 if non-CEO executives come from any two different cohorts (generations) and 0 otherwise
3+ Cohorts	Dummy variable equals 1 if non-CEO executives come from any three or four cohorts (generations) and 0 otherwise
Age Similarity (<20)	Dummy variable equals 1 if the age spread in non-CEO executives is less than 20 years and 0 otherwise
Log (Age Sd)	Log of standard deviation of executives' age
Panel D: Other characteristics	
State	Percentage of shares held by the government or state-owned enterprise
Foreign	Percentage of shares held by the foreign investor
Private	Percentage of shares held by the private investor
Executives	Number of non-CEO executives
Independent director	Percentage of independent directors
Duality	Dummy variable equals 1 if the CEO is also the chairman of the board and 0 otherwise
Executive Age	Average age of non-CEO executives
Female executive	Percentage of female executives
Board size	The natural log of board size
Leverage	Total debt/total assets
Firm size	Log of total assets
List Age	Number of years since the firm has been listed

Chapter 4 Cost of debt, excessive risk taking and board characteristics: insights from state-owned firms

4.1 Introduction

Issues relating to debt financing and state ownership have received considerable attention from the financial media. An article in *Economist* (Dec, 2016) contends that with the government on their side, state firms usually borrow cheaply. Borrowing cost only tells half of the story. Given the implicit guarantees on debt by the government, financial media have started to concern about the potential risk problems in state firms. A recent article in *the Financial Times* (July, 2017) asserts that Chinese state firms have experienced a borrowing binge and accumulated excessive debt due to the generous lending terms provided by the bank, which leads to mounting risks. Therefore, the other half of the story is about the excessive risk taking in state firms' debt financing decisions.

The debate in the media has triggered a growing body of research exploring the issue of debt financing in state firms. The literature suggests that the implication of state ownership is ambiguous. On the one side, with the implicit guarantees against debt default by the government (Borisova and Megginson, 2011) and the soft budget constraints (Kornai, 1979, 1980), state firms usually borrow at a more favourable rate than private peers (Sanchez-Ballesta and Garcia-Meca, 2011), have a higher level of leverage (Dewentwe and Malatesta, 2001) and hold less cash in hand (Borisova and Megginson, 2011). On the other side, given the non-profit-maximizing social and political goals (Shileifer and Vishny, 1993) as well as discouraged monitoring and increased moral hazard (Borisova et al., 2012; Dewenter and Malatesta, 2001), state ownership could increase the cost of debt (Borisova et al., 2015). Lacking the effective monitoring, managers in state firms are more likely to entrench themselves. They prefer less leverage to reduce risk due to their undiversified human capital (Fama, 1980) and hoard more cash

to increase the flexibility to expropriate the shareholders' value (Jensen, 1986).

Given these conflicting arguments regarding the effect of state ownership on the levels of cost of debt, leverage and cash holdings, in this paper, I examine another concern about the issue of debt financing in state firms, namely the extent to which the state firms take excessive risk in their debt financing decision compared to private firms. To address this issue, I carefully construct the predicted risk indicators and then identify the presence and magnitude of excess risk in state firms. In addition, since state firms are generally believed to have more severe agency problems and to be less efficient than private firms (Dewenter and Malatesta, 2001), I also consider whether board characteristics affect this excessive risk-taking behaviour in debt financing in state firms.

Prior studies suggest that board independence, which provides effective monitoring and control of management (Fama and Jensen, 1983), can signal a high quality of board and hence reduce the cost of debt and cash holdings and increase the leverage (Anderson et al., 2014; Fields et al., 2012; Kuan et al., 2011). In terms of board size, larger boards can bring more valuable resources to the firm (Dalton et al., 1999) and improve the information quality in the board, which can lead to lower borrowing cost and fewer loan covenants (Fields et al., 2012). To date, however, studies on board characteristics and cost of debt, leverage and cash holdings have largely focused on developed countries. To shed light on this issue in emerging market in which the state ownership tends to dominate the economy, China is chosen as an example in this study.

China, the largest emerging economy, provides an excellent setting to explore the impact of board of directors on excessive risk-taking in debt financing decisions in state firms. First, unlike western firms, Chinese firms normally have a concentrated ownership with a large government stake. In 2005, the government initiated a split share reform in which non-tradable state shares were allowed to be exchanged for tradable private shares.

However, despite the reform, the government still imposes tight controls on listed firms. Second, debt financing is an important finance source for Chinese listed firms (Shailer and Wang, 2014). Since the bond market is underdeveloped in China (Ayyagari et al., 2010), Chinese firms rely heavily on bank loans for external financing. In China, the banking sector is dominated by state-owned banks which favour state firms (Dong et al., 2016). By the end of 2015, debts held by Chinese state firms accounted for around 60% of all corporate debt. Third, Chinese firms are characterised as having weak governance and poor investor protection. In past years, the China Securities Regulatory Commission has enacted a series of governance reforms in order to improve the corporate governance of listed firms in which the board of directors is placed as the key element. Under these deepening reform of the corporate governance, it is worth estimating the effectiveness of boards of directors in Chinese firms, especially state-owned firms which have more complicated agency problems.

To study the issue of the cost of debt and excessive risk taking in debt financing decisions in Chinese state firms, I examine a sample of 19,046 firm-year observations over the period from 2002 to 2015, pertaining to 2,294 Chinese firms. In this paper, I follow Gao et al. (2013) in constructing the measures of excess risk indicators, namely, excess leverage and excess cash holdings.[24] The results first show that state-owned firms have a lower cost of debt than private firms due to implicit guarantees by the government. Then I find that state firms tend to take excessive risks in debt financing decisions. On average, there is greater evidence of positive excess leverage and negative excess cash holdings in state firms, which indicates that state-owned firms have more leverage and less cash holdings than they would have were they a private firm. This is because the government can relax the budge constraint of state firms through better access to credit and implicit

[24] Following Bradley and Chen (2015), corporate policies such as leverage and cash holdings can indicate managerial risk-taking. Therefore, we use leverage and cash holdings as risk indicators in this study.

guarantees against debt default. As a result, state firms are expected to borrow more regardless of potential default problems. Further, the government support could also reduce the precautionary incentives for holding cash in state firms.

Given the lower cost of debt, excessive leverage and less cash holdings in state firms, I take a step further to estimate whether board characteristics could affect excessive risk taking in state firms. I find that the proportion of independent directors is negatively associated with the excess cost of debt but positively related to excess leverage. This is because board independence signals an effective monitoring board, which reduces the risk premium required by the creditor. Then, state firms with board independence are likely to have a lower cost of debt and hence to become excessively leveraged. In other words, board independence could encourage the risk-taking in state-owned firms, which suggests that independent directors benefit shareholders at the expense of debtholders. Additionally, board size has positive impacts on excess cost of debt, leverage and cash holdings. This is because a larger board has less effective monitoring due to the free rider problem and is more likely to generate conflicts in the boardroom. Therefore, creditors may require a higher risk premium, resulting in a higher cost of debt. Additionally, since the manager of state firms are more likely to hoard more cash to increase the opportunities to expropriate shareholders' values, a larger board with less effective monitoring in state firms can further increase the level of cash holdings, exceeding the target value. In terms of leverage, a larger board can improve information quality by providing valuable and comprehensive resources to the board, signalling a higher board quality and receiving fewer loan covenants. Therefore, larger board in state firms can lead to excessive leverage.

This study contributes to the existing literature in two ways. First, our work provides a new perspective on studying debt financing in state firms. Previous studies have usually focused on the effect of state ownership on the level of cost of debt, the level of leverage and the level of cash holdings (e.g., Borisova and Megginson, 2011; Borisova et al., 2015;

Dewentwe and Malatesta, 2001; Shailer and Wang, 2014). In contrast, this study predicts the leverage, cash holdings and cost of debt that state firms should have and then studies the excess leverage, excess cash holdings and excess cost of debt in state-owned firms. By doing this, excessive risk taking in the debt financing decision in state-owned firms compared to private firms is identified. Second, to the best of my knowledge, this is the first empirical study to provide a comprehensive perspective on the relationship between board characteristics and excessive managerial risk only in state firms that have a severe agency problem and appear to be inefficient.

The rest of the paper proceeds as follows. Section 4.2 discusses the literature on state ownership, the cost of debt, leverage and cash holdings and hypothesis development. Section 4.3 introduces the institutional background. Section 4.4 describes the data collection procedure and methodology. Section 4.5 presents the main results and is followed by a series of robustness tests in Section 4.6. Section 4.7 offers a summary and draws the conclusions.

4.2 Literature review and hypothesis development

4.2.1 State ownership and cost of debt

Past years saw a flood of literature on debt as a mechanism for solving the agency problem based on the "control hypothesis" (Jensen, 1986). Debt is not only associated with a particular pattern of cash flows, but is defined as the ability of creditors to exercise their control (Shleifer and Vishny, 1997). An essential feature of debt is that a failure by the borrower might trigger the transfer of some control rights to the lender. Given the fact that debt could force the firm to pay out the excessive cash flow, it might prevent the managers from managerial discretion (Jensen, 1986). Therefore, debt is the remedy against the agency cost, resulting from conflicts of interest between shareholders and managers in modern corporations.

In terms of debt financing, there is a growing research investigating the influence of state ownership on the cost of debt. The literature provides us with mixed results, either positive or negative. On the one side, government ownership can lower the cost of debt. From the political perspective, governments usually impose implicit guarantees against firms' debt default and it is less likely that the government will allow the failure of the firm. However, if a state-owned firm were to face the bankruptcy, debtholders expect that the government will prop up the firm and satisfy their claims (Borisova and Megginson, 2011). These implicit guarantees are likely to reduce the perceived default risk of state-owned firms, which further decrease the risk premiums required by the investors. As a result, state-owned firms are likely to have a lower cost of debt. Most empirical studies support this argument. Sanchez-Ballesta and Garcia-Meca (2011) focus on Spanish firms over the period 1999-2002 and document a lower cost of borrowing in firms with state ownership. This is because these firms benefit from easier financing condition through the state financial agency and are backed up by governments, which reduces the perceived probability of debt default. Similarly, Shailer and Wang (2014) emphasize that government ownership signals an implicit guarantee on corporate debt as well as a substitute for weak internal governance system and find that companies under government control generally have a lower cost of debt than private peers in China.

On the other side, government ownership can increase the cost of debt. Governments direct firms to pursue social and political goals, such as excessive employment, domestic investment, wealth redistribution and low unemployment (Shileifer and Vishny, 1993; Borisova et al., 2015), at the expense of profit maximization. Since profitability can affect the firm's ability to repay its loans, these political objectives might lower firm performance, resulting in higher cost of debt. Additionally, as discussed in Borisova et al. (2012), firms with ownership by central and local governments are characterized by worse corporate governance. From the perspective of agency theory, the government ownership can discourage monitoring and develop agency problems. Unlike private firms,

the residual cash flow claims of state firms are not readily transferable, which might impair the residual claimant incentives for monitoring the management (Dewenter and Malatesta, 2001). Governments might also lack the skill to supervise the management as state firms are under the pressure to hire politically connected people rather than the best qualified (Krueger, 1990). In addition, the implicit guarantees by the government could limit other stakeholders' monitoring as they believe that the government will prop up the firm if necessary. In line with this, Borisova et al. (2015) also find that state ownership can increase moral hazard for managers and provide inefficient monitoring, which results in higher cost of debt.

As we mentioned earlier, Chinese state firms receive preferential treatments from the government and have better access to capital and resources. In China, the banking system is dominated by the state-owned banks which favour state firms (Chen et al., 2011). When making decisions, state-owned banks might perceive state firms as lower risk taking while consider private firms with high risks. Private banks might focus more on the political aspect of the firm than on the profitability. This is because private banks can build up political connections with government by providing favourable loan terms to state firms (Butler et al., 2009). Therefore, Chinese state-owned firms are usually given more generous lending terms, such as fewer covenants, less collateral and a lower cost of debt by the creditors (Brandt and Li, 2003). Hence, given the unique financial system and prevalence of state ownership in China, we hypothesize the following:

H1: State firms have a lower cost of debt than private peers.

4.2.2 State ownership and leverage

There are two factors militating towards a greater use of debt by state firms. Due to implicit government guarantees, state firms usually have better access to debt, and borrow at a favourable rate (Dewentwe and Malatesta, 2001). If any investment or project fails, the government will try to rescue the company in case of bankruptcy, otherwise, the authorities have to deal with the political costs (Faccio et al., 2006). Similarly, Boubakri

et al. (2012) also find that firms have higher level of leverage after a politician join the board of directors. Thus, state firms are usually more leveraged than private peers. In empirical studies, Dewentwe and Malatesta (2001) compare profitability, leverage and labour intensity of state-owned firms and private firms in Europe. They find that the leverage of state-owned firms exceeds that of private firms due to the government guarantee. Additionally, the agency problem between shareholders and managers is augmented in firms with a higher level of state ownership (ownership concentration) because there is a large segregation between cash flow rights and control rights (Du and Dai, 2005). While the ultimate owner of state firms is the state, the voting rights belong to government bureaucrats whose remuneration is normally not directly linked to the performance of the firm that they monitor. As a result, the government is not motivated to supervise and control a firm's management efficiently. Therefore, state-owned firms usually use a higher level of debt as a monitoring channel.

On the contrary, since governments have less incentives to monitor and control management, managers might take the opportunity to control the firm and tunnel resources from the firm. These managers tend to avoid debt to preserve their managerial opportunism (Berger et al., 1997). This is because debt is regarded as a disciplinary tool, which can constrain excessive spending and impose debt covenants. Additionally, these managers might prefer less leverage due to a desire to reduce firm risk in order to protect their undiversified human capital (Fama, 1980).

Given the implicit and explicit guarantees of government, state firms enjoy a better access to debt and are expected to take excess leverage. From the agency perspective, there are conflicting arguments. On the one side, characterized with poor governance, state firms usually more debt as an effective governance mechanism to discipline managers. On the other side, managers of state firms might prefer less debt to pursue personal managerial opportunism and protect invested human capital. However, in Chinese state firms,

managers can be hired and fired at the will of the government, which makes the manager entrenchment less likely an issue. Further, Chinese state firms receive preferential treatments and great support from the government and state-owned banks. Hence, I hypothesize that:

H2a: State firms are more likely to take excess leverage than they should have.

4.2.3 State ownership and cash holding

The efficient management of liquidity is essential to a firm's business. The finance and economics literature have identified precautionary and agency problem motives that bring firms to hold cash. Keynes (1936) proposes the precautionary motives for cash holdings that cash is held as a buffer to hedge unexpected adverse cash flow shocks. Based on this perspective, the prior literature suggests that firms with higher cash flow volatility and poor access to external finance tend to hold more cash (e.g., Acharya et al., 2007; Bates et al., 2009; Han and Qiu, 2007; Mclean, 2011). Additionally, when the financial distress is costlier, firms with better investment opportunities are likely to hold more cash (Opler et al., 1999). As the cash is held for precautionary purpose, state ownership could have a different influence on a firm's cash holdings. Based on the soft budget constraints (Kornai, 1979, 1980), government can relax the budget constraints of state firms through government subsidies, tax concessions, better access to credit and other indirect supports. This preferential access to credit can enable the state-owned firms to obtain more external financing. Further, Borisova and Megginson (2011) also argue that the government will prop up state-owned firms if necessary, which leads to lower probability of bankruptcy. Overall, given the soft budget constraints, state ownership can improve the access to finance and provide implicit guarantees against default, which might in turn decease the precautionary motive for holding cash. Similarly, Meggionson et al., (2014) find that the higher level of state ownership in Chinese privatized firms leads to a strong soft budget constraint effect. A decrease in state ownership results in an increase in cash holdings.

Grounded in agency theory, when the firm has large cash flow but low growth prospects,

managers are more likely to retain more cash in hand rather than increasing the pay-out of cash to shareholders (Jensen, 1986). In the presence of managerial discretion, it is easier for managers to accumulate more cash to pursue their private interests at the expense of shareholders. Several empirical studies have found evidence supporting the agency-based motive for holding cash (e.g., Dittmar et al., 2003; Dittmar and Mhrt-Smith, 2007; Jiang and Lei, 2016; Pinkowitz et al., 2006). In state firms, governments usually impose social and political goal, thus the evaluation of the managers might be based on the achievements of political goals rather than profit maximization (Shileifer and Vishny, 1993). Furthermore, governments lack the incentives or skilled people to monitor and supervise the management of state firms. Thus, state-owned firms are characterized by lower governance quality (Borisova et al., 2012). Given the severe agency problem, managers might hold more cash to increase the flexibility to expropriate shareholders' value based on the flexibility hypothesis (Harford et al., 2008; Jensen, 1986).

As we mentioned earlier, Chinese state firms enjoy a preferential status as the government provides great support and guarantee for them. With the better access to credit, the precautionary motive should be lower for Chinese state-owned firms. In addition, the government poses a tight control on the management and can fire the manager in Chinese state firms at their will. Therefore, manager entrenchment is less likely an issue. Given these facts, we hence address the following hypothesis:

H2b: State firms are more likely to hold less cash than they should have.

4.2.4 State ownership, board characteristics and excessive risk

In state firms, the separation of ownership and control leads to conflicts between shareholders and managers. Further, the ownership concentration can also turn the agency problem into conflicts between the controlling shareholders and minority shareholders. However, it is difficult to address the agency problem in state-owned firms as there is one more type of agency problem between the state and the controlling owner (Ding et al., 2007). Therefore, state firms are generally believed to have more severe agency problems

and to be more inefficient than private firms. Based on agency theory, the board of directors is an important internal mechanism to mitigate the agency problem (Fama and Jensen, 1983). I expect that the board of director play a significant role in controlling agency problems in state-owned firms.

4.2.4.1 Board independence

It is generally believed that independent directors in the boardroom provide effective monitoring and control of firm management (Fama and Jensen, 1983). Additionally, due to the reputational concerns as professional referees (Fama, 1980), they contribute their expertise and resources to the firm, which can reduce the managerial shirking and expropriation of shareholders' value, as well as increasing firm transparency (Armstrong et al., 2014; Byrd and Hickman, 1992).

These monitoring functions performed by independent directors can also signal a high quality board. Effective monitoring board might cause debtholders to have a great faith in internal governance and thus provide better borrowing terms, such as lower cost of debt. In line with this, Anderson et al. (2004) and Fields et al. (2012) both document a negative relationship between cost of debt and board independence in US firms. Likewise, Ashbaugh-Skaife et al. (2006) also observe that board independence can increase the credit rating and translate into significant debt cost saving for US firms. Further, based on the flexibility hypothesis, entrenched managers value future flexibility more than current overinvestment (Harford et al., 2008). As a result, they are more likely to hold large cash reserves when there is less effective monitoring of management. Therefore, board independence, which indicates effective board monitoring, can reduce the cash holding in firms. Similarly, Kuan et al. (2011) support the flexibility hypothesis, documenting a negative relationship between corporate governance (board independence) and cash holding in family-controlled firms in Taiwan.

As mentioned earlier, on the one side, state firms have implicit government guarantees

against debt, which could have more generous borrowing terms provided by the creditor. On the other side, state-owned firms have more severe agency problems. Managers of state firms are more likely to have significant control rights as state-owned firms lack effective monitoring mechanisms. As a result, managers in state-owned firms might have more incentives to reserve a large cash holding. Since higher proportion of independent directors can alleviate the agency problem and signal a high quality board with effective monitoring, I expect that board independence can further reduce cost of debt, increase leverage and reduce the cash holding in state-owned firms. Therefore, I hypothesize that:

H3: Board independence is positively related to excess leverage, but negatively related to excess cash holdings and an excess cost of debt in state firms.

4.2.4.2 Board size

Board size is believed to play an important role in directors' ability to monitor and control the management. Previous literature has identified two strands of argument regarding the role of board size. On the one side, resource dependency theory suggests that the board of directors is the provider of advice and counsel, legitimacy and communication channels (Pfeffer and Salancik, 1978). Large board is beneficial to the firm as it brings a large pool of critical resources and expertise into the firm, which can increase information quality and create an effective external linkage (Dalton et al., 1999).

On the other side, Jensen (1993) argues that large boards that have more than seven or eight directors tend to function less effectively but are more controllable for CEOs. Additionally, as the board becomes larger, the monitoring offered by the directors might become less effective because of the free rider problem (Raheja, 2005). Similarly, Eisenberg et al. (1997) also state that small boards can monitor managers more effectively, while large boards are often unwieldy. Based on some social psychology theories, a large board with different perspectives and cognitive abilities may generate conflicts among different groups of directors (Williams and O'Reilly, 1996). The benefits of monitoring capacities might be offset by the costs of poor communication and protracted decision-

making processes (Yermark, 1996).

Literature on board size and debt policy or cash holdings is scarce. Anderson et al. (2004) focus on US firms and find that large boards could increase the level of managerial monitoring and reduce the cost of debt financing. Similarly, Fields et al. (2012) find that firms with a higher board quality (larger board) are more likely to borrow at lower interest rate and have fewer loan covenants. So far, no previous studies have investigated the impact of board size on cost of debt, leverage and cash holdings in state-owned firms. Under the pressure to hire politically connected people rather than the best qualified, state firms might lack the skill to advise and monitor the management and have more severe agency problems, such as increased moral hazard and inefficient monitoring. Since board size can be seen as a "double-edged sword", the effect of board size on excess leverage and on excess cash holdings becomes a matter of empirical investigation in Chinese state firms. Thus, I hypothesize that:

H4a: Board size is positively related to excess leverage, but negatively related to excess cash holdings and excess cost of debt in state firms.

H4b: Board size is negatively related to excess leverage, but positively related to excess cash holdings and excess cost of debt in state firms.

4.3 Institutional background

It is of importance for firms to get access to finance in transition economies. In China, the financial system mainly consists of the banking sector and anequity market. In 1990 and 1991, the Shanghai Stock Exchange and the Shenzhen Stock Exchange were established, providing a new channel for Chinese firms to access the capital. The stock market initially aimed to push through the enterprise reform, involving the partial privatization of state-owned enterprises (SOEs). A major feature of the reform is the state's retention of a controlling stake in listed firms. This controlling shareholding is usually held by central government and its agencies or local and regional governments.

In 2005, the split-share structure reform began. The reform allowed non-tradable state shares to be exchanged for tradable private shares. This reform was completed in 2007, resulting in increased proportion of tradable shares and decreased state-owned shares. However, despite the reform, the government still has tight controls over Chinese listed firms.

However, the Chinese banking system appears to be much larger than its equity market and dominates the financial system. The Chinese banking sector has experienced a series of reforms over the last forty years and has surpassed that of the Eurozone to become the world's largest by size. At the end of 2015, there were RMB 99.3 trillion (USD 15.18 trillion) bank loans, about 9 times the size of the corporate bond market (China Banking Regulatory Commission, 2015). This suggests that Chinese firms rely heavily on the bank loans for their external financing. In China, the banking system is still dominated by state-owned banks which favour state-owned companies (Chen et al., 2011; Cull and Xu, 2000). State-owned firms are usually given more generous lending terms, such as fewer covenants, less collateral and a lower cost of debt by the creditors (Brandt and Li, 2003). An article in Reuters (May 10, 2016) contends that debt owned by state-owned firms in China is higher than any other rated nation. In addition, Chinese state firms have been experiencing rising leverage and shrinking profits.

Furthermore, Chinese firms have experienced deep reform in corporate governance in recent years. The Corporate Law requires firms to establish a two-tire board structure, including a board of directors and a supervisory board. As the Company Law does not subject supervisors to any legal liability, the supervisory board, so far, seems to be more decorative and is regarded as a "nominal organ" in China. China Securities Regulatory Committee issued a series of guidance on corporate governance, especially on board of directors, since 2003 stating that boards should consist of one-third of independent directors and firms are encouraged to separate the role of chairman and CEO. In state-

owned firms, the appointment of directors and top management is influenced by the government. Thus, it could be the case that some directors and top executives are politically-connected with limited business skills. As a result, state-owned firms are usually characterized by severe agency problems.

4.4 Data and methodology

4.4.1 Data and sample selection

The data are mainly obtained from the China Securities Market and Accounting Research (CSMAR) database and WIND database. In 2002, Chinese Securities Regulatory Commission (CSRC) and the State Economic and Trade Commission jointly promulgated *Corporate Governance Principles for Chinese Listed Companies.* The guidance strengthened the disclosure requirement of corporate governance for listed firms, including directors' information and ownership structure. Therefore, I choose 2002 as the sample beginning year.

The initial sample starts with all Chinese firms listed on either Shanghai Stock Exchange or the Shenzhen Stock Exchange between 2002 and 2015. I then apply a number of screenings. First, following the convention in the literature, I exclude financial firms which have unique accounting characteristics. Second, I only retain firms that disclose available information on debt financing, ownership structure and directors' characteristics (e.g., age and gender). Third, I further exclude companies that fail to have at least two observations during the study period. After the filtering procedures, the final sample consists of 19,046 firm-year observations, pertaining to 2,294 firms.

4.4.2 Model specification

4.4.2.1 Cost of debt and excess risk taking in state firms

I first aim to examine whether state-owned firms have a lower cost of debt than private

peers and whether the lower borrowing cost in state firms induces excessive risk-taking in debt financing decisions. In this study, following Wang et al., (2008), a state-owned firm is defined as a firm whose largest shareholder is the government or state-owned enterprise. The main challenge is to construct the measure of the excessive risk in state-owned firms. Since more leveraged firms are riskier and firms with a higher level of cash are expected to reduce the perceived risk as they are more likely to service their debts, (Bradley and Chen, 2015; Bliss and Gul, 2012), I follow Gao et al. (2013) to construct the measure of excess leverage, excess cash holdings and excess cost of debt in state-owned firms. To obtain the excess risk, I proceed in two steps, as shown below.

First, I employ the propensity score matching method to identify a sample of private firms that show no significant differences in financial information and corporate governance characteristics to state-owned firms. In this setup, I first assign the treatment condition – inclusion in the group of state-owned companies in a particular year. Then I employ a logit model to estimate the probability that a firm becomes a state-owned company on a comprehensive range of variables, including board level characteristics (e.g., *Duality, Independent director, Board size, Director age, Female*) and firm-level characteristics (e.g., *Size, ROA, Cash flow, Current ratio, Sale growth, Listed, Book to market ratio*).[25] In addition, I also control for year fixed effects and industry fixed effects. Next, I construct matched sample based on probability (i.e., the propensity score) of being a state-owned company estimated from the logit model. I adopt the one-to-one nearest neighbor approach to match each state-owned company in the treated sub-sample with a private firm in the control sub-sample based on the predicted propensity score.[26] Furthermore, I require the maximum difference between the propensity score of each state-owned firm

[25] Following Caliendo and Kopeinig (2008), I include all available variables that not only affect the status of state-owned company but also our outcome variable, cost of debt.
[26] For robustness check, I also employ other matching methods, including five to one nearest matching, kernel matching and radius matching.

and that of the matched peer to be less than 0.005 in absolute value.[27] Finally, I obtain 2,191 observations from the treated sub-sample (state firms) and 2,141 observations from the control sub-sample (private firms). After the matching, I conduct several diagnostic tests to check the matching balance (See Appendix 4.1). The results suggest that the balancing property is satisfied for the matched sample of state-owned and private firms.

Second, I apply each individual state-owned firm characteristics to the regression models (1), (2) and (3) estimated using only the matched private firm sub-sample and obtain the predicted leverage, cash holdings and cost of debt for each individual state-owned firm. Therefore, excess leverage, excess cash holdings and excess cost of debt are the difference between a firm's actual leverage, cash holdings and cost of debt and predicted leverage cash holdings and cost of debt.

$$Cost\ of\ debt_{i,t} = \alpha + X_{i,t-1}\delta + \theta_t + \mu_i + \varepsilon_{i,t} \quad (1)$$

$$Leverage_{i,t} = \alpha + Y_{i,t-1}\delta + \theta_t + \mu_i + \varepsilon_{i,t} \quad (2)$$

$$Cash\ holdings_{i,t} = \alpha + Z_{i,t-1}\delta + \theta_t + \mu_i + \varepsilon_{i,t} \quad (3)$$

Where i is the firm identifier and t is the year. Models (1), (2) and (3) are all estimated by the fixed-effects estimator, which is justified using the Hausman Test. μ is an individual-specific effect, which varies across firms, and θ_t is the year fixed effect. ε denotes to the error term, which varies both among banks and periods of time. All of the independent variables are one-year lagged. Vectors $X, Y\ and\ Z$ consist of different firm level control variables based on previous studies.[28] The reported standard errors are adjusted for potential heteroscedasticity.

[27] Our results remain robust when I change the maximum difference in propensity score to 0.01 and 0.001.

[28] Vector X and Z includes Duality, Independent Directors, Board size, Lnage, Female, Leverage, Book to market, Cash flow, Current ratio, Size, ROA, Sale growth and Listed. Vector Y includes Duality, Independent Directors, Board size, Lnage, Female, Book to market, Cash flow, Current ratio, Size, ROA, Sale growth, Listed and Tangibility.

4.4.2.2 Board characteristics and excessive risks in state-owned companies

To estimate the impacts of board characteristics on excessive risk in state-owned companies, I employ the following model (4) specified as:

$$Excess\ risk\ indicators_{i,t} = \alpha + \sum_1^j \beta_j Board\ characteristics_{j,i,t-1} + X_{i,t-1}\delta + \theta_t + \mu_i + \varepsilon_{i,t} \quad (4)$$

Similar to models (1), (2) and (3), model (4) is estimated by the fixed-effects estimator, which is also justified using the Hausman Test. μ is an individual-specific effect, which varies across firms, and θ_t is the year fixed effect. ε denotes to the error term, which varies both among banks and periods of time. $Excess\ risk\ indicators$ is captured by the excess leverage, excess cash holdings and excess cost of debt. $Board\ characteristics$ includes a vector of board variables. The key interest of coefficient β_j captures the impact of board characteristics on excessive risk-taking behavior.

4.4.3 Variables description

4.4.3.1 Excess leverage, excess cash holdings and excess cost of debt

In most existing studies (Anderson et al., 2003; Borisova et al., 2015; Chakravarty. and Rutherford, 2017), the cost of debt is defined as the spread between the corporate bond yield and a benchmark. However, since the corporate bond market is underdeveloped in China and other emerging economies, we follow Kim et al. (2011), Ma et al. (2017) and Sanchez-Ballesta and Garcia-Meca (2011) to measure cost of debt as interest expenses for the year divided by the average short-term and long-term debt during the year (*Cost of debt*). Following Dong et al. (2010) and Halling et al. (2017), I measure leverage as the ratio of debt to total assets (*Leverage*). Additionally, cash holdings is cash and cash equivalents scaled by assets (*Cash holdings*) (Jiang and Lie, 2016; Gao et al., 2013). In this paper, excessive risk indicators in state firms are defined as follow:

Excess leverage = Actual leverage – Predicted leverage

Excess cash holdings= Actual cash holdings – Predicted cash holdings

Excess cost of debt = Actual cost of debt – Predicted cost of debt

4.4.3.2 Board characteristics variables

Following the existing literature (e.g., Anderson et al., 2004; Liang et al., 2013), I focus on board independence and board size. Board independence is measured by the faction of independent directors (*Independent director*) who have strong incentives to monitor the management (Liu et al., 2015). For consistency with previous studies, *Board size* is the natural log of the total number of directors on the board. Additionally, I also include other board level variables that might affect the outcome. The dual position of the chairman of the firm and the CEO of the firm is captured by a dummy variable *Duality*. With respect to directors' characteristics, *Director age* is the natural log of the average age of all directors. I also include the percentage of female directors (*Female director*) who are more diligent monitors than male directors (Adams and Ferreira., 2009).

4.4.3.3 Control variables

Based on prior research (e.g., Anderson et al., 2003; Bliss and Gul, 2012; Chakravarty, S. and Rutherford, 2017; Ma et al., 2017), a set of control variables that might affect the cost of debt, leverage and cash holdings is included.[29] Since large firms are associated with lower cost of debt and are perceived as less risky because of increased asset diversification and greater financial strength (Zou and Adam,2008), I control for firm size which is measured as the natural log of the total number of employees (*Size*). *ROA* is the net income divided by the total assets, reflecting how efficiently the firm produces profits through the given assets and their ability to repay debt. *Cash flow* is the ratio of the net operating cash flow scaled by total assets. Book to market ratio (*BM*) is generally regarded as the measure for the growth prospects of the firm. *Current ratio* is the defined as current assets to current liabilities, reflecting the firm's ability to meet its obligation and being negatively related to cost of debt. S*ales growth* is defined as the change in sales

[29] Models (1) and (2) include three separate sets of control variables that might affect the cost of debt, leverage and cash holdings, separately.

revenue from the previous year scaled by sales revenue in the previous year. *Tangibility* is the ratio of tangible assets to total assets. I also control for list age (*List)*, the natural log of the total listed years of the firm.

4.4.4.4 Descriptive statistics

Table 4.1 reports the descriptive statistics of the variables used in the analysis, broken down by all firms, state-owned firms and private firms. On average, state-owned firms pay a significantly lower cost of debt (0.500 percentage points lower) than private firms, which is in line with previous studies (e.g., Shailer and Wang, 2015). State-owned firms are more leveraged than private firms, indicating that state-owned firms prefer a risker capital structure. The average leverage ratio of state-owned firms is 0.262 which is significantly higher than that of private firms (0.232). I also find that state-owned companies tend to hold less cash (3.000 percentage points lower) than private firms on average.

<Insert Table 4.1 about here>

With respect to board characteristics, CEO duality occurs in nearly 20.1% of the state-owned firms and 23.8% of private firms. Around 34.4% of independent directors are serving on the board in state-owned firms, while the figure is 36.3% in private firms. The results are comparable to Shailer and Wang (2015) who find that state-owned firms have less CEO duality and independent directors. State-owned companies, on average, have a significantly larger board size than private peers, which is similar to Jiang and Zeng (2014). I also observe that the average age of directors of state-owned firms is 48.075 which is similar to that of private firms (48.424). The average ratio of female directors is 15.7% in state-owned firms, which is around 5.4% lower than that of private firms.

In terms of financial variables, the average cash flow ratio is 0.049 in state-owned companies, while the figure is 0.038 in private firms. In line with previous studies (e.g., Shailer and Wang, 2015), state-owned firms, on average, are significantly larger than private firms in the form of the total number of employees. Compared to private peers,

state-owned companies are less profitable with a lower average ROA (0.025), which is comparable to the figure in Jiang and Zeng (2014). This might imply that government impose some non-profit-maximizing social and political objectives on state-owned firms. I also find that state-owned firms have a lower average current ratio but a higher sales growth than private peers. Additionally, on average state-owned firms have been listed for nearly 8.943 years, while the figure is significantly larger (9.709 years) in private firms.

4.5 Empirical analysis

4.5.1 Cost of debt in state-firms

In the first part of the analysis, we examine whether state-owned firms have lower of cost of debt by employing the propensity score matching method. Table 4.2 reports the results of propensity score matching estimation. The first is the one-to-one nearest neighbor matching estimator. A significant difference in cost of debt between state-owned firms and matched private firms is found. Consistent with H1, state-owned companies' lower cost of debt, at 3.7 percentage points less than private peers, which is also comparable with the study on Chinese firms by Shailer and Wang (2015) and the strand of literature in non-China samples (Borisova and Megginson, 2011; Sanchez-Ballesta and Garcia-Meca, 2011).

<Insert Table 4.2 about here>

The result is in line with the government guarantee argument and preferential treatment argument. First, from the political perspective, governments usually impose explicit and implicit guarantees against the debt default of the firms and it is less likely that the government will allow the firm to fail. However, if a state-owned firm were to face bankruptcy, debtholders would expect that the government will prop up the firm and satisfy their claims (Borisova and Megginson, 2011). These implicit guarantees are likely to reduce the perceived default risk of state-owned firms, which further decrease the risk premiums required by the investors. As a result, the state-owned firms are likely to have

a lower cost of debt (Borisova et al., 2015; Borisova and Megginson, 2011; Faccio et al., 2006; Sanchez-Ballesta and Garcia-Meca, 2011). Second, since the corporate bond market is underdeveloped in China, firms tend to rely on bank loans. Although the Chinese banks claim that all borrowers are treated equally if they have the same level of credibility, in fact, state-owned firms usually receive more generous borrowing terms, such as large share of credits and a lower cost of debt, by large state banks (Dong et al., 2016). This can be explained by the special bank-firm relationship in China, whereby state-owned banks used to have a closer relationship with state-owned firms (Allen et al., 2005).

Additionally, I also employ other alternative matching estimators. In Table 4.4, the second one is a five-to-one nearest neighbor method (i.e., we select five matches for each state-owned firm). The third matching algorithm utilizes all the potential matches and uses kernel weighting according to the distance between the propensity score of the treated subject and that of the matching observation (Heckman et al., 1998). The last method is radius matching which matches all the available comparison observations that lie within the caliper (Dehejia and Wahba, 2002). Table 4.4 shows that the results remain the same when the other three matching estimators are applied. In detail, a significantly lower cost of debt is apparent in state-owned firms than private firms.

4.5.2 Do state-owned firms take excessive risks in debt financing decisions?

Given the lower borrowing costs, I aim to estimate whether state firms take excess risk in the debt financing decisions. After propensity score matching, we obtain a matched sample of state-owned and private firms. I use this matched private firm sample to estimate the excessive risk in state-owned companies. Table 4.5 reports the estimated coefficients of cost of debt, leverage and cash holding based on the sub-sample of matched private firms in columns (1) to (3), respectively. Based on the coefficient estimates in Table 4.3, I predict the cost of debt, leverage and cash holding for each state-owned firms. Next, I obtain the *Excess leverage, Excess cash holdings* and *Excess cost of*

debt of state-owned firms, as shown in Table 4.4 and Figure 4.2.

<Insert Table 4.3 about here>

<Insert Table 4.4 about here>

<Insert Figure 4.2 about here>

The results show that state firms are more likely to take excessive risks in debt financing decisions. On average, more than half of the state-owned companies have positive excess leverage, negative excess cash holdings and a negative excess cost of debt, which supports hypotheses H2a and H2b. More specifically, the average excess cost of debt, excess leverage and excess cash holdings are -0.002, 0.019 and -0.016, respectively. This suggests that more than half of state-owned companies tend to have lower cost of debt, higher leverage and less cash holding than they would have were they a private firm.

The results support the government implicit guarantee and soft budget constraints argument. Government ownership can offer an implicit guarantee against the debt default of the firm. Compared to private firms, state-owned firms usually pursue social and political goals at the expense of profit, such as maintaining excessive employment, promoting domestic investments and developing key industries that are beneficial to society. Given these political factors, governments are unwilling to allow state-owned firms to fail. Therefore, such implicit guarantees by the governments improve the access to finance and facilitate state firms borrowing, regardless of default. Additionally, the government can relax the budge constraint of state firms through government subsidies, tax concession, better access to credit and other indirect methods, as well as reducing the precautionary motive for holding cash in state firms.

4.5.3 Board characteristics and excessive risk in state-owned companies

Given the excessive risk-taking in the debt financing decisions in state-owned firms, I further estimate whether the board characteristics might affect the excess leverage, excess cash holdings and excess cost of debt for state firms in Table 4.5.

<Insert Table 4.5 about here>

In line with the hypothesis H2, the *Independent director* imposes a negative impact on the excess cost of debt but positive effects on excess leverage. In particular, one percentage point increase in the percentage of independent directors can lead to a decrease in the excess cost of debt by approximately 0.024 percentage points but it can increase the excess leverage by around 0.103 percentage points. In other words, state firms with more independent directors are more likely to have a lower level of cost of debt and a higher level of leverage compared to otherwise similar private peers. This is comparable with previous studies (e.g., Anderson et al., 2004; Bradley and Chen, 2015; Fields et al., 2012; Rahaman and Zaman, 2012). Independent directors can provide the best monitoring and control of firm management (Fama and Jesen, 1983). Creditors might benefit from the monitoring functions of independent directors, such as alleviating the managerial shirking and improving the transparency, which, in turn, reduces the firms' cost of borrowing (Lorca et al., 2011). Therefore, in state-owned firms which already have an implicit guarantee on debt from the government, board independence can further lower their cost of debt financing. However, higher board independence encourages excessive managerial risk-taking, suggesting that in state-owned firms, independent directors act in the interests of shareholders (the government).

With respect to board size, the coefficients are significant and positive in columns (1), (2) and (3). In detail, a one percentage point increase in board size can augment *Excess cost of debt, Excess leverage* and *Excess cash holding* by 0.012 percentage points, 0.034 percentage points and 0.023 percentage points, respectively. I can find that state firms with larger boards tend to have higher borrowing cost. This is partially in line with previous studies (Lorca et al., 2010). Large boards have difficulties in coordinating all the directors, which might lead to free-rider problems (Jensen, 1993). Thus, large boards are less effective because the benefits of monitoring capacities could be offset by the incremental cost of communication and problems in the decision-making process (Yermack, 1996). Therefore, creditors might increase the risk premium.

Additionally, state firms with larger boards are more likely to have a lower level of leverage, which indicates that board size can reduce excessive managerial risk-taking in state firms. Due to the increased cost of debt, state-firms with large board size might hold more cash in hand to buffer the uncertainty and reduce the probability of default. In this way, a large board is beneficial to debtholders in state firms. However, the positive coefficient of *Board size* on *Excess leverage* indicates that state firms tend to take excessive managerial risks in the form of excessive leverage when they have a large group of directors, which is in contrast to the findings of previous studies. This might be due to the fact that in state firms, smaller boards are more likely to choose a lower leverage ratio in order to alleviate the negative effect associated with debt on risky investment.

With respect to other board variables, *Director age* poses negative effects on the *Excess cost of debt, Excess leverage* and *Excess cash holding* in all specifications (significance level at 1% level). *Female* is positively related to leverage deviation, which suggests that state firms with higher percentage of female directors tend to take excessive risk. In terms of other firm characteristics, *Leverage* decreases the deviation in cost of debt (significance at 10% level) and cash holding (significance at 1% level). Size and the age of being listed (*List*) both have a negative effect on the deviation of cash holding, suggesting a higher level of managerial risk-taking. However, *Cash flow* can increase the cash holding difference at the 1% significance level. Additionally, *ROA, Cash flow* and *Current ratio* all pose a negative influence on leverage deviation but *Book to market* ratio exerts a positive impact.

4.6. Robustness

To re-estimate the relationship between board characteristics and excessive risk-taking in debt financing decisions in model (4), we employ the alternative measures of excess risk indicators. Since the values of the cost of debt, leverage and cash holding are all positive,

we use the difference between the natural logarithm of actual cost of debt, actual leverage and actual cash holding and the natural logarithm of their predicted values. Table 4.6 shows the results of the robustness check. In line with the main results in Table 4.5, the percentage of independent directors is negatively related to the excess cost of debt but positively associated with excess leverage. Additionally, I also find a consistently positive relationship between board size and the excess cost of debt.

<Insert Table 4.6 about here>

4.7 Conclusion

This paper extends the existing literature on debt financing and state ownership by providing the first empirical evidence regarding the impact of board characteristics on excessive risk taking in debt financing decisions in state firms. To address the issue of excessive risk, I follow Gao et al. (2013) to predict the leverage, cash holdings and cost of debt for state-owned firms and then define the excess leverage, excess cash holdings and excess cost of debt as the difference between their actual values and predicted values.

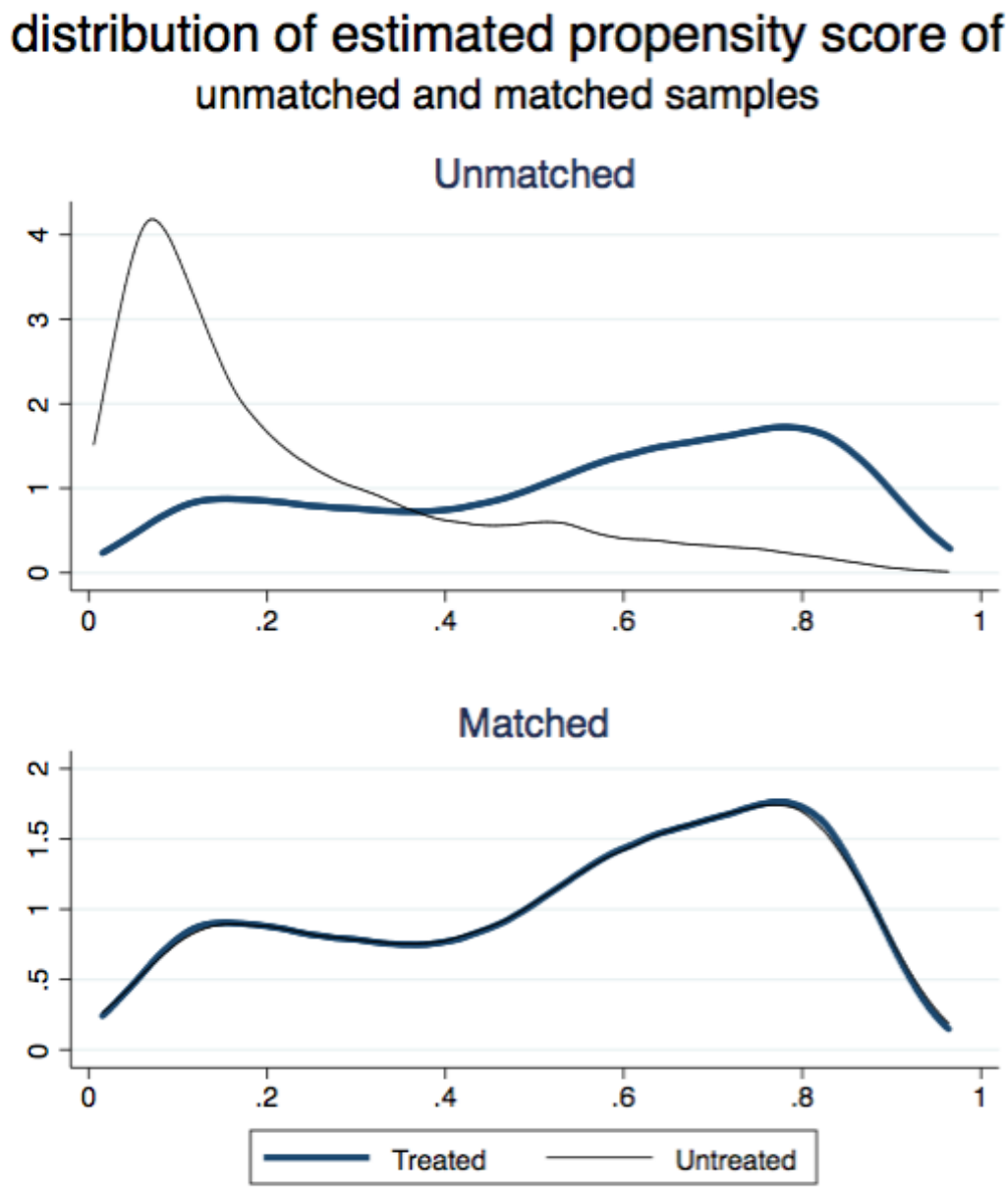
The results show that state firms have a lower cost of debt due to the implicit government guarantees. I also find that state firms tend to take excessive risks in debt financing decisions. In particular, there is much evidence of excess leverage, cash holding shortfall and a lower cost of debt in state firms compared to otherwise similar private firms. Although governments direct state firms to pursue non-profit-maximizing social and political goals, this study suggests that the implicit guarantees play a significant role in Chinese state firms. With the government standing on their side, state firms have more favorable borrowing rate and then have excessive leverage. Furthermore, the implicit government guarantee can also decrease the precautionary motive for state firms to hold more cash.

Given that state firms take excessive risk in debt financing decisions, I then take a step

further to estimate whether board characteristics can have influence on excessive risk in state firms. The results show that the proportion of independent directors is negatively associated with the excess cost of debt but positively related to excess leverage. However, board size has a positive impact on excess cost of debt, excess leverage and excess cash holdings. I can interpret the results from the agency perspective and implicit guarantee arguments. First, board independence signals an effective monitoring board, which reduces the risk premium required by the creditor. In addition, state firms with board independence can have a lower cost of debt and hence become excessively leveraged. Second, a larger board tend to have less effective monitoring due to the free rider problem and is more likely to generate conflicts in the boardroom. Therefore, creditors may require higher risk premium, resulting in higher cost of debt. Additionally, the state firms have inefficient monitoring as the managers are more likely to be politically appointed rather than best qualified. Thus, a larger board with less effective monitoring in state firms can weaken the agency problem and further increase the level of cash holding to exceed the target value. In terms of leverage, a larger board can improve the information quality by providing valuable and comprehensive resources for the board, signalling a higher board quality and receiving fewer loan covenants. Therefore, a larger board in state firms can lead to excessive leverage.

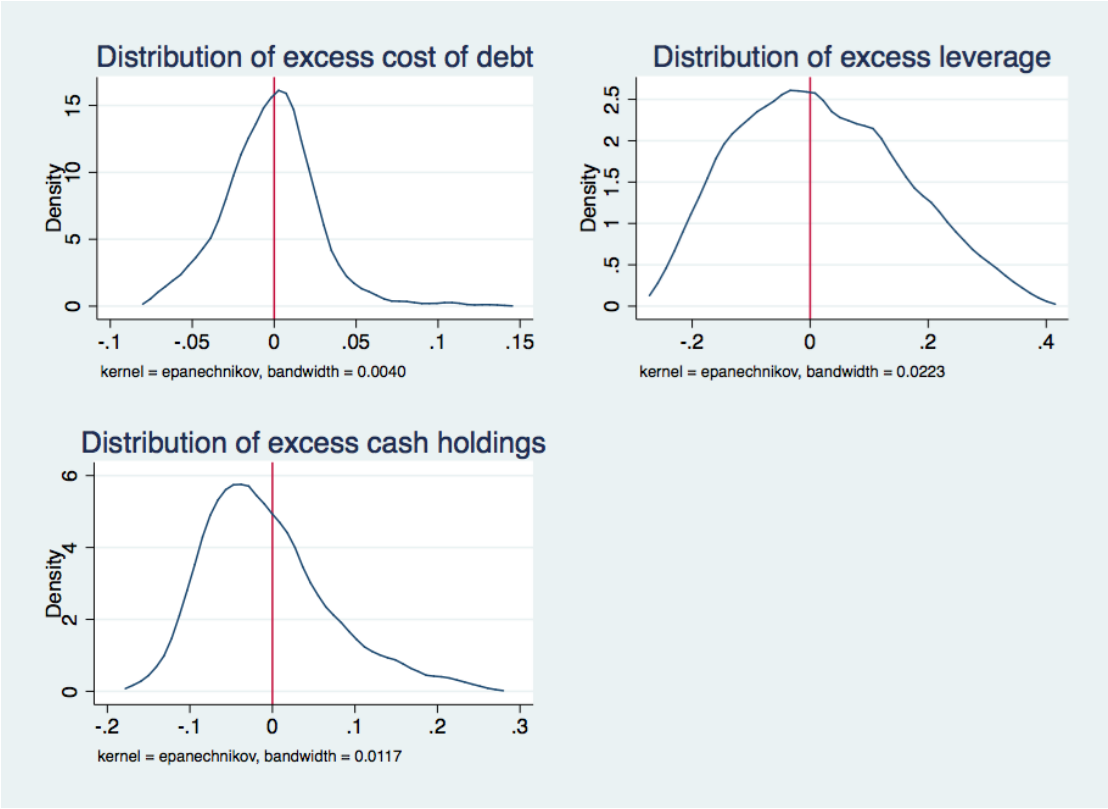
These findings provide useful guidance for regulators, policymakers, and directors concerning debt financing and cash policies and shed light on the direction of further corporate governance reform. In particular, the findings suggest that, state firms receive more preferential treatments than private firms due to implicit guarantees. By highlighting the benefits of government control in Chinese firms, the results also suggest that state firms take excessive managerial risk and board characteristics can further increase the excessive risk. Under the current weak corporate governance system in China, state firms should look to improve the quality of boards of directors and reduce excessive risk-taking.

Figure 4.1 Matching quality



Notes: This figure shows the distribution of propensity score of unmatched and matched samples.

Figure 4.2 Distribution of difference in cost of debt, leverage and cash holding



Notes: This figure shows distribution of excess cost of debt, excess leverage and excess cash holdings in state firms.

Table 4.1 Summary statistics

Variables	State-owned firms		Private firms		Difference
	Mean	Std	Mean	Std	
Ln(cost of debt)	-2.968	0.517	-2.927	0.568	-0.041***
Leverage	0.262	0.163	0.232	0.161	0.030***
Cash holding	0.146	0.098	0.162	0.109	-0.016***
Duality	0.201	0.401	0.238	0.426	-0.037***
Independent director	0.344	0.057	0.363	0.051	-0.020***
Board size	2.254	0.190	2.180	0.175	0.074***
Director age	3.871	0.068	3.878	0.067	-0.007***
Female	0.157	0.134	0.212	0.158	-0.055***
Size	7.702	1.257	7.501	1.209	0.201***
ROA	0.025	0.055	0.030	0.054	-0.005***
Cash flow	0.049	0.070	0.038	0.070	0.011***
Current ratio	1.396	0.935	1.735	1.277	-0.340***
Sale growth	0.202	0.397	0.170	0.395	0.032***
List	2.014	0.648	2.033	0.750	-0.019*
Book to market	1.153	0.812	0.934	0.762	0.218***

Notes: This table compares descriptive statistics for key variables between state firms and private firms. The sample is an unbalanced panel covering 2,294 firms over the period from 2002 to 2015.

Table 4.2 Average treatment effect for the treated (ATT)

Matching algorithms	Difference of ATT	S.E.	T-value
One-to-one Nearest Neighbour matching	-0.037	0.017	-2.23
Five-to-one Nearest Neighbour matching	-0.038	0.014	-2.61
Kernel matching	-0.031	0.014	-2.21
Radius matching	-0.030	0.013	-2.21

Notes: This table shows the average treatment effect for the treated sample where the outcome is the cost of debt.

Table 4.3 prediction of parameters based on matched private firms

	Cost of debt	Leverage	Cash holdings
	(1)	(2)	(3)
Duality	-0.001	-0.004	-0.006
	(0.004)	(0.009)	(0.008)
Independent director	0.072	0.018	-0.027
	(0.062)	(0.118)	(0.069)
Board size	-0.014	0.007	-0.027
	(0.011)	(0.034)	(0.029)
Director age	0.018	0.014	0.066
	(0.032)	(0.088)	(0.069)
Female	-0.012	-0.058	-0.001
	(0.012)	(0.038)	(0.030)
Size	0.003	0.039***	0.004
	(0.003)	(0.007)	(0.005)
ROA	0.016	-0.260***	0.223***
	(0.016)	(0.045)	(0.044)
Cash flow	-0.007***	-0.037***	0.050***
	(0.002)	(0.007)	(0.007)
Current ratio	0.000	0.008	0.007
	(0.002)	(0.007)	(0.005)
Sales growth	-0.047**	-0.251***	0.090*
	(0.020)	(0.063)	(0.051)
List	0.002	0.012	0.001
	(0.002)	(0.010)	(0.006)
Book to market	-0.025**	0.045*	-0.010
	(0.011)	(0.027)	(0.025)
Leverage	-0.078***		0.030
	(0.013)		(0.032)
Tangibility		-0.082	
		(0.091)	
N	1,950	1,950	1,926
r2	0.147	0.245	0.244

Notes: This table reports the regression results of prediction of cost of debt, leverage and cash holdings based on the matched private firms. The results of cost of debt, leverage and cash holdings are presented in columns (1) to (3), respectively. *Board Size* is the natural log of board size. The dummy variable *Duality* is equal to one if the bank governor is also the chairman of the board, and zero otherwise. *Independent directors* is the percentage of independent directors. *Female* is the percentage of female directors. Director age is the natural log of average age of the board. ROA is the net income divided by the total assets. *Cash flow* is the ratio of net operating cash flow scaled by total assets. Book to market ratio (*BM*) is book value of the firm to the market value of the firm. *Current ratio* is the defined as the current assets to its current liability. Sales growth is defined as the change in sales revenue from previous year scaled by sales revenue in the previous year. *List* is the natural log of the total listed years of the firm. *Tangibility* is the ratio of tangible assets to total assets. It employs the panel fixed effect estimator with lagged independent variables. Constant and year dummies are included into the estimation but not reported. The robust error of each coefficient is shown in parentheses. *, **, *** indicate statistical significance level at 10%, 5%, and 1%, respectively.

Table 4.4 Summary statistics of excess cost of debt, leverage and cash holdings

	Excess cost of debt			Excess leverage			Excess cash holdings		
	Positive	Negative	Total	Positive	Negative	Total	Positive	Negative	Total
Mean	0.020	-0.022	-0.002	0.129	-0.100	0.019	0.068	-0.057	-0.006
Min	0.000	-0.076	-0.076	0.000	-0.250	-0.250	0.000	-0.166	-0.166
Max	0.141	-0.000	0.141	0.141	-0.000	0.393	0.268	-0.000	0.268
N	2,585	2,861	5,446	2,910	2,707	5,617	2,208	3,192	5,400

Notes: This table presents the descriptive statistics regarding excess cost of debt, excess leverage and excess cash holdings in state-owned firms over the period from 2002 to 2015. The table provides the mean, minimum and maximum values of positive, negative and overall excess cost of debt, excess leverage and excess cash holdings.

Table 4.5 Excess risk and board characteristics in state-owned companies

	Excess cost of debt	Excess leverage	Excess cash holdings
	(1)	(2)	(3)
Independent director	-0.024**	0.103**	-0.014
	(0.011)	(0.046)	(0.029)
Board size	0.012***	0.034*	0.023*
	(0.004)	(0.020)	(0.013)
Duality	0.000	-0.002	0.004
	(0.002)	(0.005)	(0.004)
Director age	-0.026*	-0.118*	-0.079*
	(0.015)	(0.065)	(0.042)
Female	0.009	0.051**	-0.011
	(0.007)	(0.025)	(0.017)
Size	0.000	-0.001	-0.006**
	(0.001)	(0.005)	(0.003)
ROA	-0.010	-0.087*	-0.001
	(0.012)	(0.046)	(0.032)
Cash flow	0.007	-0.185***	0.093***
	(0.008)	(0.028)	(0.021)
Current ratio	-0.003**	-0.008**	0.004
	(0.001)	(0.004)	(0.003)
Sales growth	-0.001	0.002	0.001
	(0.001)	(0.004)	(0.003)
List	0.019***	-0.016	-0.023***
	(0.003)	(0.011)	(0.008)
Book to market	0.002**	0.030***	0.000
	(0.001)	(0.004)	(0.002)
Leverage	-0.013*		-0.072***
	(0.007)		(0.017)
Tangibility		0.010	
		(0.061)	
N	4,038	4,136	3,996
r2	0.066	0.116	0.087

Notes: This table reports the regression results of the effects of board characteristics on excessive managerial risk in state firms. The results of the excessive risk indicators measured by the deviation in cost of debt, leverage and cash holdings are presented in columns (1) to (3), respectively. *Board Size* is the natural log of board size. The dummy variable *Duality* is equal to one if the bank governor is also the chairman of the board, and zero otherwise. *Independent directors* is the percentage of independent directors. *Female* is the percentage of female directors. Director age is the natural log of average age of the board. ROA is the net income divided by the total assets. *Cash flow* is the ratio of net operating cash flow scaled by total assets. Book to market ratio (*BM*) is book value of the firm to the market value of the firm. *Current ratio* is the defined as the current assets to its current liability. Sales growth is defined as the change in sales revenue from previous year scaled by sales revenue in the previous year. *List* is the natural log of the total listed years of the firm. *Tangibility* is the ratio of tangible assets to total assets. It employs the panel fixed effect estimator with lagged independent variables. Constant and year dummies are included into the estimation but not reported. The robust error of each coefficient is shown in parentheses. *, **, *** indicate statistical significance level at 10%, 5%, and 1%, respectively.

Table 4.6 Excess risk and board characteristics in state-owned companies: robustness

	Excess cost of debt	Excess leverage	Excess cash holdings
	(1)	(2)	(3)
Independent director	-0.517**	0.468*	-0.060
	(0.230)	(0.277)	(0.248)
Board size	0.172**	0.108	0.204*
	(0.080)	(0.124)	(0.105)
Duality	0.015	-0.056	0.038
	(0.028)	(0.040)	(0.028)
Director age	-0.502*	-0.742	-0.578*
	(0.303)	(0.504)	(0.323)
Female	0.169	0.179	-0.154
	(0.121)	(0.185)	(0.132)
Size	0.022	0.026	-0.058**
	(0.027)	(0.038)	(0.023)
ROA	-0.177	-0.482	0.196
	(0.218)	(0.312)	(0.274)
Cash flow	0.141	-1.078***	0.596***
	(0.173)	(0.183)	(0.148)
Current ratio	-0.053**	-0.103***	0.031
	(0.021)	(0.027)	(0.023)
Sales growth	-0.023	-0.017	0.014
	(0.019)	(0.027)	(0.020)
List	0.358***	-0.084	-0.197***
	(0.051)	(0.075)	(0.053)
Book to market	0.036*	0.130***	-0.002
	(0.019)	(0.027)	(0.020)
Leverage	0.044		-0.573***
	(0.139)		(0.131)
Tangibility		0.102	
		(0.434)	
N	4,033	4,107	3,979
r2	0.065	0.080	0.078

Notes: This table reports the robust regression results of the effects of board characteristics on excessive managerial risk in state firms where the excess values is calculated by the log difference between the predicted value and actual value. The results of the excessive risk indicators measured by the deviation in cost of debt, leverage and cash holdings are presented in columns (1) to (3), respectively. *Board Size* is the natural log of board size. The dummy variable *Duality* is equal to one if the bank governor is also the chairman of the board, and zero otherwise. *Independent directors* is the percentage of independent directors. *Female* is the percentage of female directors. Director age is the natural log of average age of the board. ROA is the net income divided by the total assets. *Cash flow* is the ratio of net operating cash flow scaled by total assets. Book to market ratio (*BM*) is book value of the firm to the market value of the firm. *Current ratio* is the defined as the current assets to its current liability. Sales growth is defined as the change in sales revenue from previous year scaled by sales revenue in the previous year. *List* is the natural log of the total listed years of the firm. *Tangibility* is the ratio of tangible assets to total assets. It employs the panel fixed effect estimator with lagged independent variables. Constant and year dummies are included into the estimation but not reported. The robust error of each coefficient is shown in parentheses. *, **, *** indicate statistical significance level at 10%, 5%, and 1%, respectively.

Appendix 4.1 Matching quality

After the matching, we conduct the diagnostic tests to check the matching balance. First, we re-estimate the logit model for the matched sample. The results are shown in column (2) of Appendix 4.1a. All the coefficients are not statistically significant, which indicates that there are no distinguishable trends in cost of debt. Additionally, the magnitudes of all the coefficients in column (2) are smaller than those in column (1). This suggest that the propensity matching rules out the observable difference other than the difference in ownership. Second, we compare the state-owned firms and matched private firms by testing the difference in each observable characteristics. The reports are presented in Appendix 4.1b. None of the difference in the mean of the observable variables is statistically significant, suggesting that the state-owned firms are indistinguishable to matched private firms other than the ownership structure. Third, since the treated and matched control subjects with the same propensity score should have identical distribution (Rosenbaum and Rubin, 1983), we also plot the density estimates for the distribution of matched and unmatched sample in Figure 4.1. The overlapped propensity score indicates that the balancing property is satisfied for our matched sample of state-owned and private firms.

Appendix 4.1a Probability of being a state-owned company

	Being a state-owned company	
	Pre-match	Post-match
	(1)	(2)
Duality	-0.272***	0.031
	(0.086)	(0.108)
Independent director	-0.300	0.153
	(0.776)	(0.897)
Board size	0.510**	-0.094
	(0.241)	(0.271)
Director age	4.772***	-0.346
	(0.682)	(0.774)
Female	-0.458	-0.108
	(0.285)	(0.329)
Size	0.166***	-0.023
	(0.041)	(0.044)
ROA	-0.275	-0.320
	(0.650)	(0.764)
Cash flow	-0.633	-0.042
	(0.422)	(0.559)
Current ratio	0.086**	-0.005
	(0.040)	(0.049)
Sale growth	0.144**	0.016
	(0.068)	(0.083)
List	0.342***	-0.043
	(0.066)	(0.073)
Book to market	0.068	0.055
	(0.055)	(0.065)
Year dummy	Yes	Yes
Industry dummy	Yes	Yes
N	13,202	4,327

Notes: This table reports the regression results of the logit model where the dependent variable is the probability of being a state-owned firm. Column (1) presents the results before the matching while column (2) shows the results after the matching. *Board Size* is the natural log of board size. The dummy variable *Duality* is equal to one if the bank governor is also the chairman of the board, and zero otherwise. *Independent directors* is the percentage of independent directors. *Female* is the percentage of female directors. Director age is the natural log of average age of the board. ROA is the net income divided by the total assets. *Cash flow* is the ratio of net operating cash flow scaled by total assets. Book to market ratio (*BM*) is book value of the firm to the market value of the firm. *Current ratio* is the defined as the current assets to its current liability. Sales growth is defined as the change in sales revenue from previous year scaled by sales revenue in the previous year. *List* is the natural log of the total listed years of the firm. The robust error of each coefficient is shown in parentheses. *, **, *** indicate statistical significance level at 10%, 5%, and 1%, respectively.

Appendix 4.1b Difference in board and firm characteristics after the matching

Variables	State-owned firms			Matched private firms			Difference	t-stat
	Mean	Std	N	Mean	Std	N		
Duality	0.181	0.385	2,141	0.186	0.389	2,191	-0.005	0.700
Independent director	0.349	0.053	2,141	0.349	0.054	2,191	-0.000	0.930
Board size	2.233	0.186	2,141	2.230	0.180	2,191	0.004	0.517
Director age	3.869	0.071	2,141	3.868	0.067	2,191	0.001	0.731
Female	0.170	0.139	2,141	0.169	0.138	2,191	0.000	0.993
Size	7.654	1.241	2,141	7.625	1.251	2,191	0.029	0.442
ROA	0.027	0.056	2,141	0.026	0.051	2,191	0.001	0.520
Cash flow	0.045	0.067	2,141	0.044	0.068	2,191	0.001	0.799
Current ratio	1.415	1.015	2,141	1.410	0.903	2,191	0.005	0.865
Sale growth	0.200	0.391	2,141	0.201	0.399	2,191	-0.001	0.921
List	2.077	0.655	2,141	2.070	0.694	2,191	0.007	0.718
Book to market	1.130	0.799	2,141	1.149	0.819	2,191	-0.019	0.437

Notes: This table compare the mean difference in key variables between state firms and private firms after the matching.

Chapter 5 Conclusion

5.1 Overview of main finding

This thesis extends extant research on the role of board of directors to China. It fills the gaps in the existing literature relating to: 1) board age diversity, 2) executives' competition and tournament incentives, and 3) board characteristic and excessive risk in debt financing. In particular, the issues of how age diversity matters in banks, how executives' age composition matters in the tournament competition, and how board characteristics matter in excessive risk-taking in state-owned firms have been addressed and been thoroughly explored. To this end, this thesis contributes significantly to studies on board of directors.

Chapter 2 studies the effect of board age diversity on bank profitability and risk by employing a sample of 97 Chinese banks over the period from 2009 to 2013. The result first shows that board age diversity in Chinese banks has a significant impact on bank profitability. To further examine why age diversity negatively affects bank performance, directors' age diversity is then decomposed into their personal value diversity. The heterogeneity of directors' values with respect to risk, prudence and wealth is found to be negatively related to bank profitability. These results suggest that directors of different ages are likely to hold diverse values on risk, prudence and wealth, and to approach decisions differently. This, in turn, can slow down the decision process in the board room and generate more conflicts among the directors, leading to worse bank performance.

Chapter 3 investigates the role of age heterogeneity of non-CEO executives in the relationship between tournament incentives and firm performance. Using data on Chinese firms listed on either the Shanghai Stock Exchange or the Shenzhen Stock Exchange between 2005 and 2015, I first find that a large pay gap between CEOs and non-CEO executives could improve firm performance. Then I take a step further to estimate the

effectiveness of tournament incentives through the age heterogeneity of non-CEO executives. The results show that the tournament effect is weaker in firms where the non-CEO executives are from different age cohorts (three or more). This suggests that seniority, which is highly valued in China, provides reduced incentives for younger executives and discourages them from competing with senior executives. This discouragement is then likely to weaken the tournament effect. However, the positive link between pay gap and firm performance becomes stronger when the executives are of a similar age. This could be explained by the peer effect argument. That is, non-CEO executives usually perceive that they have the similar probability of promotion with similar-aged peers and then compete more fervently. In this way, increased peer competition motivates non-CEO executives to expend more effort and ultimately strengthen the tournament effect.

Chapter 4 investigates the impact of board characteristics on excessive risk-taking on debt financing decisions in state firms by utilizing a sample of Chinese listed firms over the period from 2002 to 2015. First, state firms are found to have lower costs of debt than private firms. Second, state firms tend to take excessive risk in debt financing. In particular, more than half of the state firms have excess leverage and cash shortfall, as well as lower cost of debt compared to otherwise similar private firms due to implicit government guarantees and soft budget constraint argument. Third, board characteristics could affect the excessive risk taking in state firms. Specifically, the proportion of independent directors is negatively associated with excess cost of debt but positively related to excess leverage. This suggests that board independence signals an effective monitoring board that reduces the risk premium required by the creditor. As a result, state firms with board independence can have a lower cost of debt and hence become excessively leveraged. However, board size has a positive impact on the excess cost of debt, excess leverage and excess cash holdings. This is because a larger board has less effective monitoring due to the free rider problem and is more likely to generate conflicts

in the boardroom. Therefore, creditors may require a higher risk premium, resulting in a higher cost of debt. Additionally, since the managers of state firms are more likely to entrench themselves, a larger board with less effective monitoring in state firms can further increase the level of cash holding to exceed the target value. In terms of leverage, a larger board can improve information quality by providing valuable and comprehensive resources for the board, signaling a higher board quality and receiving fewer loan covenants. Therefore, a larger board in state firms can lead to excessive leverage.

5.2 Implications

This thesis provides some useful implications for researchers and practitioners. With respect to board diversity, previous studies based on resource dependence theory have argued that a more diverse board provides more external resources and enhances firm performance. The findings in Chapter 2, however, indicate that under the weak corporate governance system in China, an age-diverse board is not beneficial for banks. Banks with weak governance should look to adding directors of a similar age into their board, to narrow the generation gap. In addition, results from Chapter 2 can be generalized to other transition countries that are transforming from a centrally planned economy to a market-based economy. In these countries, since culture changes alongside economic development, directors from different generations are more likely to hold diverse values. To strive for optimal board composition, the board should appreciate the age and value differences among directors, utilize the benefits of directors' different human capital, and create an effective and balanced board.

Given the huge remuneration of CEOs and the increasing pay gap among executives, Chapter 3 highlights the importance of the rank order tournament as an incentive mechanism for motivating non-CEO executives in Chinese firms. Furthermore, Chapter 3 also provides interdisciplinary evidence that the psychological composition of non-CEO executives matters in the design of an executive compensation scheme. In the

current state of a weak corporate governance system in China, firms should consider adding executives of a similar age to their top team in order to narrow the generation gap and thereby improve firm performance.

In relation to debt financing, the findings in Chapter 4 suggests that state firms in China recieve more preferential treatment than private firms due to implicit guarantees. With the benefits of government control in Chinese firms, Chapter 4 also indicates that state firms tend to take excessive managerial risks and that board characteristics can further increase the excessive risk. Under the current weak corporate governance system in China, state firms should look to improve the quality of board of directors and reduce excessive risk.

5.3 Limitations and suggestions for future research

This research has several limitations, which might be addressed in future studies. First, this thesis considers a single country, China. The findings can only be generalized to other transition countries who share similar legal traditions and governance systems with China. However, there are also limitations in the generalization of the results to the rest of the world.

Second, Chapter 2 focuses on 97 Chinese banks. Although these banks include all the major larger banks, accounting for around three quarters of the total assets of Chinese banking institutions at the end of 2013, there is a concern about relatively small sample size, as there are many new, unlisted and smaller banks which do not disclose governance information. Thus, further research could take these banks into account.

Third, due to the data limitation, it is not possible to control for the effect of some CEO characteristics (e.g., education and tenure) in Chapters 2, 3 and 4. Future research regarding the role of board of directors might include these characteristics as CEOs tend

to have a significant influence in decision-making in Chinese firms.

Fourth, in Chapter 4 I focus on state-owned firms in general owing to data limitations. Further research could divide the state-owned firms into firms controlled by the central or local government and by state-owned enterprises (SOEs). This is because these two types of state control tend to have different impacts on Chinese firms, in particular on excessive risk-taking behaviour and board composition. In government-controlled firms, the board of directors are appointed or approved by the government and they have less incentives to monitor the firm. In contrast, SOE-controlled firms have more autonomy as there is less interference from the government and more responsibility regarding the firm's profits. Directors in SOE-controlled firms are appointed by SOE controlling shareholders.

5.4 Final remarks

In summary, this thesis makes an important step towards a better understanding of the role of board of directors in banks as well as in non-financial firms in the context of economic, finance, organizational and psychological theories. All the findings in this research provide potential directions for future research in the field of board of directors, especially in emerging markets.

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