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Diversity and Firm Performance:
Evidence from China**

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Tournament incentives, age diversity and firm performance: Evidence from China

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Abstract

This study introduces a new dimension, age diversity of non-CEO executives, which moderates the relationship between promotion-based tournament incentives, measured as the pay gap between the CEO and non-CEO executives, and firm performance. We find that tournament incentives relate positively to firm performance. This relationship weakens when non-CEO executives are from different age cohorts, but is enhanced when non-CEO executives come from the same age cohort. We reason that age hierarchy reduces incentives for younger executives to compete with older executives. Our findings provide implications for firms in countries that value seniority when setting executive compensation and organizational structure.

JEL codes: G30; J10; J33

Keywords: Executive compensation; Tournament effect; Non-CEO executives; Age diversity; Seniority

1 Introduction

In 2017, the average US CEO earned 361 times more than people earning the national average wage.¹ This excessive pay disparity has also extended to the top echelons of the corporate hierarchy that is between the CEO and other executives at the next level. As public controversy over the remarkable level of CEO pay continues to flare up in the press, a large number of academic studies² have been devoted to better understanding the pay inequality in the workplace and investigating its effects on firm-level outcomes. The tournament theory proposed by Lazear and Rosen (1981) and Rosen (1986) suggests that the pay gap between the CEO and non-CEO executives provides inherent incentives for non-CEO executives to compete with each other. In a rank-order tournament, the executive with the highest output usually wins the competition, is promoted to the position of CEO, and receives the promotion prize measured as the pay gap. This pay gap, combined with the uncertainty about promotion, encourages non-CEO executives to expend more efforts, which, in turn contributes to firm performance.

The tournament theory has been widely supported in the literature (e.g., Chen et al., 2011; Kale et al., 2009; Lin and Lu, 2009; Mobbs and Raheja, 2012). Some studies suggest that the effectiveness of tournament incentives is stronger when the firm has a sound governance structure, is part of a non-innovative, low-tech industry, operates in countries that value competition, power and fairness in income, and the CEO is an insider or near retirement (e.g., Burns et al., 2017; Kale et al., 2009; Lee et al., 2008; Lin et al., 2013, Shen and Zhang, 2017). To date, the sociological and psychological profiles of non-CEO executives have been largely ignored in the literature. Firms need the talent, effort and

¹ See more detailed information at: <https://www.reuters.com/article/us-usa-compensation-ceos/ceos-earn-361-times-more-than-the-average-us-worker-union-report-idUSKCN1IN2FU>.

² Various models have emerged to explain executive pay outcomes. See Bebchuk and Fried (2003) and Garen (1994) for the agency model that the optimal contract provides managers with efficient incentives to act in the best interests of shareholders, and Finkelstein (1992) and Lambert et al. (1993) for the managerial power model, which acknowledges the power of executives to shape the compensation decision made by the board.

resources, not only from the CEO, but also from non-CEO executives who occupy important positions in the firm (Pissaris et al., 2015). Under the tournament framework, it is the non-CEO executives who face the promotion-based tournament incentives. In this study, we extend the literature by considering the organizational structure of non-CEO executives and introducing it as a moderator that affects non-CEO executives' incentives to compete in the tournament.

Non-CEO executives can be viewed as an appropriate peer group. To compete for the same tournament prize, one executive's effort affects the behaviour of his/her peers, thereby exerting peer pressure on them (Kandel and Lazear, 1992). We argue that non-CEO executives' incentives to compete depend on the age heterogeneity among them. When non-CEO executives are of a similar age, they tend to group themselves into the same social category (Turner, 1985). Belonging to the same age cohort, these executives believe in a similar chance of a promotion and compete fervently. However, in an age-diverse environment, older managers, with rich experience and influence in the field, often occupy the top positions and have a higher chance of promotion within the company (Chen and Chung, 2012; Mills, 1985; Sadri et al., 1999; Takahashi, 2006). The presence of an age hierarchy may lead to reduced incentives for younger executives to compete if they anticipate a lower probability of winning the prize. Therefore, we hypothesize that non-CEO executives' incentives to compete become weaker when large age heterogeneity exists but stronger when non-CEO executives are of a similar age.

China provides us with an ideal context to explore whether the age diversity affects non-CEO executives' incentives to compete. Given China's large population and limited resources, competition is fierce especially among similarly aged peers, as they all seek to acquire the same resources (Liu and Lafreniere, 2014). Despite decades of market-based reforms across Mainland China, the Chinese people still hold an underlying set of values

based on their Confucian roots (Fan, 2000). According to the Five Codes of Ethics by Confucianism, their values are embedded in a hierarchal and patriarchal system, in which individuals owe respect to their seniors. In a Confucian society, elderly people usually enjoy a higher status and have the most valuable resources (Bond and Hwang, 1986). Empirical evidence (e.g., Fan, 2000; Wall, 2009; Liu, 2010) has documented that Confucianism has played a significant role in shaping the business environment in China. Valuing seniority and age hierarchy could affect the probability of promotion and, therefore, discourage competition in groups.

For a sample of Chinese listed firms from 2005 to 2015, we document a significant and positive relationship between the CEO and non-CEO executives' pay gap and firm performance, which is consistent with the tournament theory. Furthermore, we investigate whether the tournament effect is moderated by the age diversity of non-CEO executives. Our findings suggest that, when non-CEO executives have a higher level of age heterogeneity, the tournament effect becomes weaker. In contrast, the tournament effect is enhanced when non-CEO executives are from the same age cohort. More interestingly, we find that the negative moderation effect of age diversity is more pronounced in state firms than in private firms, which indicates a potentially severe age hierarchy problem in the state firms. The negative influence of age diversity on the tournament effect is also more pronounced in the Northern China Plain cultural region, where the Confucianism atmosphere is stronger than in other regions. The negative moderation effect disappears in firms with CEOs who have overseas experience. Our analysis is robust with regard to several alternative measures of tournament incentives, age diversity and firm performance.

This study makes two important contributions to the literature. First, we integrate the tournament model on hierarchical structure of organizational pay (Lazear and Rosen, 1981; Rosen, 1986) with the society hierarchy. The organization theorists have long argued that

economic models are too constrained and that non-economic factors that critically affect managerial compensation have been largely ignored (Baron and Cook, 1992). Our study offers a new channel, the age diversity of non-CEO executives capturing the age hierarchy in a society, as a moderator on the pay gap and firm performance relationship. Secondly, previous literature has studied the impact of management diversity on firm performance, illustrating mixed results. Several studies (e.g., Certo et al., 2006; Dezsö and Ross, 2012; Nieslen and Nieslen, 2013) demonstrate the benefits of diversity, showing that diverse groups are more innovative and have a better ability to solve complex problems, which boosts decision quality. Only a few studies (e.g., Earley and Mosakowski, 2000; Lovelace et al., 2001; Qian et al., 2013) have highlighted the costs of diversity and argued that too much diversity can create factions and conflicts. Our results provide evidence that “*diversity is itself diverse*” (Klein and Harrison, 2007), supporting the view that the economic impact of diversity is contextually and dimensionally dependent. The results confirm that the application of a universal theory capturing the performance outcomes of management diversity is not warranted.

Our study provides interdisciplinary implications for corporate governance and human resource management. It also highlights the importance of the demographic composition of non-CEO executives in relation to the effectiveness of tournament incentives. The sociological values of executives should be taken into account in setting the internal pay structure. Our results show that, as suggested by Boone and Hendriks (2009), diversity may not always be a positive force: having an age-diverse team may have negative consequences on incentives to compete. The findings from this study are relevant not only for China but also for other countries and regions (e.g., Japan, Korea, Latin America, and Africa), in which seniority is highly valued. Companies should learn to manage the generational gaps in the senior management team and utilize the benefits to obtain the optimal executive composition.

This rest of this paper is organized as follows. In Section 2, we discuss the literature on tournament incentives, age diversity and firm performance. Section 3 describes the sample composition and methodology. In Section 4, we discuss our empirical results. Section 5 contains robustness checks. We provide concluding remarks in Section 6.

2 Literature review and hypothesis development

2.1 Tournament incentives and firm performance

The large pay gap between the CEO and non-CEO executives cannot be completely explained by the conventional marginal product argument (O'Reilly et al., 1988). When a senior executive is promoted to the position of CEO, his/her salary is likely to double or triple while this executive's managerial skills cannot be simultaneously doubled or tripled in that one-day period. To address this puzzle, Lazear and Rosen (1981) propose the tournament theory, in which tournament participants compete with each other and are paid based on their rank in the competition. Non-CEO executives can be viewed as competing in a tournament. The winner is promoted to the position of CEO and receives the prize equivalent to the pay gap between the CEO and other executives. The possibility of attaining this high status provides irresistible incentives for non-CEO executives to expend more effort. Within the agency framework (Jensen and Meckling, 1976), the absolute performance-based contract is not optimal, as managers can manipulate the output. Ranked order tournament incentives are preferred, as larger prizes provide contestants with stronger incentives to perform better than their competitors. As a result, the interests of managers and shareholders tend to align under the tournament competition, which ultimately improves firm performance (Lazear and Rosen, 1981).

However, a large pay gap between the CEO and non-CEO executives increases CEO power (Lambert et al., 1993) and enables entrenched CEOs to increase their ability to set their own pay and expropriate shareholders' wealth (Dye, 1984; Bebchuk et al., 2011; Kale et

al., 2009). Such pay-gap-created promotion incentives can also lead to greater managerial risk-taking (Kini and Williams, 2012) and a higher propensity to commit fraud (Haß et al., 2015). Since the inputs are difficult to measure, CEO pay gaps can be perceived as unfair, even though CEOs may contribute more (Cowherd and Levine, 1992). As a result, the feeling of deprivation discourages coordination and invites group sabotage at a lower corporate level, which may have a negative impact on firm performance (Lazear, 1989).

The empirical literature provides mixed findings regarding the effect of CEO pay gap on firm performance. A number of studies (e.g, Eriksson, 1999; Kale et al., 2009; Lee et al., 2008; Mobbs and Raheja, 2012; Sanchez-Marin and Baixauli-Soler, 2015) provide evidence that higher pay gaps between the CEO and non-CEO executives are associated with better firm performance, while Conyon et al. (2001) and Bebchuk et al. (2011) show insignificant and opposite results. Several studies find that the tournament theory fits well in the Chinese context. Chen et al. (2011), Hu et al., (2013) and Kato and Long (2011) find that the positive relationship between pay gap and firm performance is stronger for non-state firms, while Lin and Lu (2009) suggest that tournament incentives are more effective for Chinese firms with greater managerial power. Lin et al. (2013) show that tournament incentives work well only for non-high-tech Chinese firms with a low level of R&D intensity.

Different from previous studies on tournament incentives in China, we employ a more comprehensive dataset, which covers each individual executive's compensation. Overall, the tournament theory provides a solid theoretical foundation for a positive role of the pay disparity between the CEO and non-CEO executives. A larger pay gap motivates other executives to expend more efforts to secure their promotion and thereby ultimately enhances firm performance. Thus, we test the following baseline hypothesis:

H₁: The pay gap between the CEO and non-CEO executives is positively associated with firm performance.

2.2 Peer effect, age and seniority

In the tournament framework, the best relative performer is promoted to the next level in the corporate hierarchy, while others passed over. If each senior executive views the likelihood of promotion to the CEO as the same, then the firm can generate great effort from them by increasing the size of the promotion prize (Bognanno, 2001). The CEO pay gap provides non-CEO executives with incentives to expend more efforts, which, in turn increases their chances of promotion and contributes to firm performance. In this study, we argue that the non-CEO executives' incentives to compete depend on the organizational structure of them.

Non-CEO executives can be viewed as an appropriate peer group at the top level of the firm. To compete for the same tournament prize, the promotion to the CEO position, one non-CEO executive's effort can affect the behaviour of his/her peers and exert peer pressure on them. Modern corporations are usually managed by a group of executives who work as a team. At the group level, age is a salient variable of social categorization. Same-aged individuals attract each other and usually group together (Lawrence, 1988). According to the social categorization theory (Turner, 1985) and the similarity-attraction paradigm (Byrne, 1971), individuals of a similar age are more likely to develop similar values. A higher demographic similarity leads to a greater perception of fairness among them (Tajfel, 1970). Under the tournament promotion system, non-CEO executives of a similar age might consider themselves to be in the same social category with similar experience, thereby having a similar probability of winning the tournament prize. Thus, non-CEO executives of a similar age have more incentives to compete.

Age conveys information about an individual's cumulative human capital, such as education, experience and intellectual ability (Child, 1974; Medawar, 1952; Rhodes, 1983). Career opportunities might be heavily age-biased at workplaces with heterogeneous age

composition (Kunze et al., 2013). In many cases, the supervisors and employees at higher ranks of the corporate ladder are older than those at lower levels. The presence of age hierarchy might produce the feeling of “collective relative deprivation” among groups (Snape and Redman, 2003).

In countries influenced by Confucianism, seniority is highly valued, and the elderly are traditionally considered to be the locus of wisdom, authority and power. In the Chinese society, there is an ethical morality of respect for seniority, which is the product of Confucianism dating back to antiquity. Senior people enjoy power not only in the household but also in politics and organizations (Chen and Chung, 2012). They are generally believed to possess a richer experience, vaster knowledge and greater influence/reputation in a specific field, when compared to younger people (Mishra and Jhunjhunwala, 2013). The phenomenon of age hierarchy/discrimination and “collective relative deprivation” might be more severe in the Chinese context. As a result, younger employees might have the impression that they are disadvantaged due to their young age, while other senior or older groups are favoured (Kunze et al., 2013). The feeling of relative deprivation reduces non-CEO executives’ incentives to compete.

2.3 Tournament incentives, age diversity and performance

On the basis of social categorization theory (Turner, 1985) and the similarity-attraction paradigm (Byrne, 1971), age similarity among non-CEO executives leads to greater perception of fairness and higher group integration. Therefore, under the tournament promotion system, non-CEO executives of similar ages have more incentives to compete. We expect the peer competition among non-CEO executives of a similar age to enhance the tournament effect.

In relation to age hierarchy/discrimination and seniority arguments, *ceteris paribus*, we would expect elderly non-CEO executives to be more likely to be promoted at Chinese

firms, while younger executives have a relatively lower chance for a promotion unless they have an outstanding talent and competence. As such, seniority reduces incentives for young non-CEO executives to compete and increases their inclination to devote less effort at work, which ultimately weakens the tournament effect. Therefore, we propose the following hypothesis:

H₂: The tournament effect is weaker (stronger) in firms where the non-CEO executives have a higher (lower) level of age heterogeneity.

3 Sample selection and research design

3.1 Sample and data

Our initial sample includes all firms listed on the Shanghai or Shenzhen Stock Exchanges from the CSMAR database for the period of 2005-2015. Our sample period starts in 2005, as it is the first year for which individual executive compensation is available³. The CSMAR database reports 1,342 listed firms on the Shanghai and Shenzhen Stock Exchanges in 2005, which increased to 2,690 by 2015. Following the previous studies (e.g., Chen et al., 2011; Hu et al., 2013; Lin et al., 2013), we first exclude financial firms due to their unique accounting characteristics. We define the CEO as the person who is identified as the chief executive officer or general manager. All other executives are classified as non-CEO executives. Following Kale et al. (2009), we include only companies that have an identifiable CEO and at least three non-CEO executives with disclosed remuneration and demographic information (i.e., age). We further exclude companies that have less than two firm-year observations. After the data filtering procedure, our final sample consists of 19,014 firm-year observations.

³ 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. Most companies complied from 2002 by disclosing the aggregated compensation of the top three executives only.

3.2 Model specification

We hypothesize (H₁) a positive effect of CEO pay gap on firm performance. To test this hypothesis, we employ the following Equation (1):

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

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

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

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

Equation (2) includes the age diversity of non-CEO executives and its interaction term with the pay gap. The coefficient of the interaction variable φ in Equation (2) captures the moderation effect of the age diversity of non-CEO executives. Equations (1) and (2) are estimated by a fixed-effects (FE) estimator with robust standard errors. All right hand side variables are lagged to reduce simultaneity concerns.

3.3 Description of variables

3.3.1 Pay gap

Following Eriksson (1999) and Kale et al. (2009), our primary tournament measure is the compensation gap between the CEO and non-CEO executives, which captures the strength of tournament incentives, as it reflects the increase in compensation if an executive wins the tournament. In our study, we use total cash remuneration, as Chinese listed firms

disclose only the total cash payment without dividing it into salary and bonus⁴. Then we apply the logarithmic transformation of the pay gap as follows:

$$\text{Log (Pay Gap)} = \text{Log (Compensation of CEO - Median value of compensation of non-CEO executives)}^5$$

3.3.2 Age diversity of non-CEO executives

We employ a new measure, age cohorts, to proxy the age diversity among non-CEO executives. 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 his/her late-teens (Ralston et al., 1999). Therefore, we define four age cohorts that correspond to specific social and political events at the age of 18. These four cohorts are based on an executive's birth year: 1931–1947 cohort (Communist Consolidation generation), 1948–1958 cohort (Cultural Revolution generation), 1959–1974 cohort (Social Reform generation) and 1975–1992 cohort (Societal generation) (Egri and Ralston, 2004; Ralston et al., 1999).

To measure the age diversity, we calculate the number of cohorts among non-CEO executives (*Number of Cohorts*). The larger the number of cohorts, the higher is the age diversity level. We also construct two dummy variables. *2 Cohorts* equals one if the non-CEO executives are from any two different age cohorts, and zero otherwise. *3+ Cohorts* equals one if the non-CEO executives are from any three or more different age cohorts, and zero otherwise.

⁴ The size of non-cash compensations in the forms of stocks or stock options is very small in Chinese firms (Bryson et al., 2014; Zhang et al., 2018).

⁵ In some cases, 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 a negative pay gap. To address this issue, we follow previous studies (e.g., Hartman, 1984 and Kale et al., 2009) and add the absolute value of the minimum negative pay gap to each observation, to transform all the observations monotonically.

3.3.3 Firm performance and control variables

We employ three firm performance measures. Return on Assets (*ROA*) is the ratio of the firm's net income to total assets. Return on Equity (*ROE*) is defined as the firm's net income divided by book value of total equity. Following Chen et al.'s (2011) work on tournament incentives in China, we also include earnings per share (*EPS*) as a proxy of firm performance.

We group the control variables into four categories. First, the three variables on board characteristics include the natural logarithm of board size (*Board Size*), the percentage of independent directors (*Independent Directors*), and a dummy variable (*Duality*), which equals one if the CEO is also the chairman. Second, we control for other CEO characteristics including the percentage of female executives (*Female Executives*), the natural logarithm of CEO age (*CEO Age*), and the average age of non-CEO executives (*Executives Age*). Third, we employ the ownership control variables including the proportions of shares owned by state-owned enterprises/central/local governments (*State*) and foreign investors (*Foreign*). Finally, some firm-specific characteristics, such as size, leverage and firm age, are also controlled for. All variable definitions are summarized in Appendix A.

3.4 Descriptive statistics

Table 1 presents summary statistics for our sample. Similar to previous studies on China (e.g., Chen et al., 2011; Hu et al., 2013; Lin and Lu, 2009), *ROA* and *ROE* reported in Panel A are on average 0.05 and 0.07, respectively. The average value of *EPS* is 0.35. Panel B reports the measures for tournament incentives. The average pay gap between the CEO and non-CEO executives is 194.20 thousand CNY (30.53 thousand USD). The pay gap has a large spread with 15,722.5 thousand CNY (2,472.01 thousand USD) as the maximum value. The average pay gap at Chinese listed firms has an upward trend increasing from 78.95

thousand CNY (12.41 thousand USD) in 2005 to 272.98 thousand CNY (42.92 thousand USD) in 2015 (nearly quadrupled).

<Insert Table 1 about here>

Panel C presents the age characteristics of non-CEO executives. After dividing all non-CEO executives into four age cohorts, we find that, in more than half of the sample firms, non-CEO executives are from two different age cohorts. Figure 1 shows that one age cohort composition remains stable at approximately 20% of the firms and that three or more age cohorts fluctuate between 20% and 30% from 2005 to 2015.

<Insert Figure 1 about here>

Panel D reports summary statistics for the control variables. On average, board size is 8.99 in our sample firms, with 37% independent directors. These figures are close to the 9.11 and 33.2% reported for Chinese firms by Hu et al. (2013) and satisfy the requirement of CSRC that more than one third of the board should be comprised of independent directors. Female executives account for 15% of the total number of executives, and 21% of CEOs hold a dual position of chairman. The CEOs are on average 47.92 years old with the oldest age being 78, while non-CEO executives have an average age of 46.21. With regard to ownership structure, shares held by the state-owned enterprise or government averages at 11%. The leverage is around 0.45, which is comparable with that shown as 0.46 and 0.47 for Chinese firms in Hu et al. (2013) and Liu et al. (2014), respectively. In addition, the firms' average listed age is around 8.99 years.

<Insert Table 2 about here>

Table 2 presents a correlation matrix of main variables used in Equations (1) and (2). Previous studies suggest that a correlation of 0.7 or higher in absolute value indicates a multicollinearity (e.g., Liu et al., 2014). Table 2 shows that three performance measures (*ROA*, *ROE*, *EPS*) have correlations higher than 0.7. With respect to other independent

variables, there is no clear evidence of multicollinearity. The test for multicollinearity is also conducted, and the magnitude of VIF is generally small.

4 Empirical analysis

4.1 *Tournament incentives and firm performance*

Our first hypothesis (H_1) predicts that the pay gap between the CEO and non-CEO executives is positively associated with firm performance. Table 3 reports our findings on the incentive effects of tournaments on firm performance using fixed effects models. The dependent variables are *ROA*, *ROE* and *EPS* in models (1) to (3), respectively. Consistent with our hypothesis and previous studies (e.g., Chen et al., 2011; Hu et al., 2013; Kale et al., 2009), the tournament prize is positively and significantly associated with firm performance in all model specifications. Specifically, a 10% increase in the CEO pay gap (*Log (Pay gap)*) results in a 0.20 percent point, 0.56 percent point and 2.26 CNY (0.36 USD) increase in *ROA*, *ROE* and *EPS*, respectively. Our results confirm that the tournament theory is supported for Chinese firms.

<Insert Table 3 about here>

With respect to the control variables, we find that ownership structure plays an important role in influencing firm performance in China. Similar to Kato and Long (2011) and Liu et al. (2014), state ownership has a significant and positive impact on firm performance in all specifications. This supports the argument that firms' political connections help them to receive more support and preferential treatment from the government and gain better access to resources, authorities and business connections (Sun et al., 2000; Tian and Estrin, 2008; Yu, 2013). We also find that the degree of leverage is positively related to firm performance and that firms with a larger size show worse levels of *ROA*, *ROE* and *EPS*. In addition, firm age exerts a significant and negative influence on *ROA* and *EPS* at the 5% level and the 1% level, respectively, which is in line with Liu et al. (2014).

4.2 Age diversity, tournament incentives and firm performance

In this section, we test the second hypothesis of whether the age heterogeneity among non-CEO executives can moderate the relationship between the CEO pay gap and firm performance. Table 4 reports the regressions results based on estimating Equation (2) on all measures of firm performance with the interaction of pay gap with age heterogeneity.

<Insert Table 4 about here>

Consistent with Table 3, the positive relationship between the CEO pay gap and firm performance still holds. Across all specifications, the coefficient on the interaction term between *Log (Pay gap)* and *Number of cohorts* is negative and significant at the 1% level. The larger the number of age cohorts among non-CEO executives, the weaker the impact of pay gap on firm performance. This provides strong support for our second hypothesis (H₂) that tournament incentives are likely to be less effective in firms where non-CEO executives have heterogeneous ages. Our results provide evidence for the seniority argument in the Chinese society (Chen and Chung, 2012; Mishra and Jhunjhunwala, 2013). Influenced by Confucian culture, if young non-CEO executives perceive a lower chance of winning the tournament prize, they are discouraged from competing with the older non-CEO executives and might spend less effort in their work, which consequently leads to a weaker tournament effect.

To test whether the negative moderating effect is linear across different age cohorts, in Table 5, we construct two dummy variables for the cohort number (*2 Cohorts* and *3+ Cohorts*) to measure age diversity in Equation (2). This is different from Table 4, in which we treat the number of age cohorts as a continuous variable. The estimated coefficients of the interactions for *2 Cohorts* and *3+ Cohorts* are negative and significant in all specifications, which indicates that firms with non-CEO executives who are from any two or more different age cohorts have weaker tournament effects compared to firms with non-CEO executives

who are from one age cohort. More specifically, the magnitude of the coefficients for *3+ Cohorts* is larger than that for *2 Cohorts* for all *ROA*, *ROE* and *EPS* specifications. This result confirms our previous findings in Table 4 that the tournament effect becomes weaker when the number of age cohorts among non-CEO executives increases in the firm. Further, the negative effect is more significant when there are three or more age cohorts among non-CEO executives.

<Insert Table 5 about here>

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

In recent years, the Chinese Communist Party has placed significant emphasis on the important role of Confucianism in the new age of reform (Du, 2015) and made seniority one of the most discernible factors when nominating government candidates in China (Chen and Chung, 2002). Anecdotal evidence shows that elderly leaders play an important role in Chinese politics. For example, the average age of the top seven leaders in the Chinese Politburo's Standing Committee is 62.85 years, and their ages range 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 and the government. Recently, the Chinese press (People.cn, Oct 2016) has suggested that state firms should eradicate the idea of seniority as a basis for promotion and instead promote younger candidates, who are talented and competent. Therefore, we compare the moderating effect of age diversity in state firms and non-state firms.

<Insert Table 6 about here>

The univariate test results in Panel A of Table 6 show that, on average, state firms have a significantly smaller CEO pay gap, a lower age heterogeneity among non-CEO executives, and an older CEO than non-state firms. Panel B of Table 6 shows that, in models (4) to (6) for state firms, the coefficient on interaction term between the pay gap and the number of age

cohorts is negative and significant at the 5% level in the *ROA* and *EPS* specifications and significant at the 10% level in the *ROE* specification. In models (1) to (3) for non-state firms, the coefficient on the interaction term is significant and negative only when the firm performance is measured by *ROA*, and the magnitude of the coefficient (-0.013) is smaller than the -0.031 for state firms. The results confirm our conjecture that the negative influence of age heterogeneity on the tournament effect is more significant in state firms than non-state firms due to the outmoded practice of seniority that is overstressed at the government and state firms.

4.4 Does the impact of age diversity on the tournament effect vary by the CEO's overseas experience?

Countries differ from one another with respect to culture, legal environment and economic development (Hofstede, 1980). Studying or working in a foreign country provides CEOs with a unique experience that cannot be acquired in their home country (Roth, 1995). CEOs with overseas experience are more likely to be influenced by the foreign country's culture. In turn, they bring Westernized business ideas and values back to the firm and help the firm develop distinctive world views and establish global networks (Carpenter et al., 2001; Le and Kroll, 2017). As a result, the traditional culture of Confucianism might be weakened in Chinese firms that have CEOs with overseas experience. With the increased emphasis on globalization, the number of CEOs with overseas experience is on the rise around the world. The percentage of CEOs with overseas experience in our sample firms increases from 3.6% in 2005 to 7.3% in 2015⁶. We test whether the negative effect of age diversity on the tournament effect varies depending upon the CEO's overseas experience.

⁶ In our sample, most of CEOs (with three exceptions only) have overseas experience from developed countries, including the US, the UK, Canada, Australia, New Zealand, Switzerland, Italy, Japan, France, Germany, Singapore, Spain, Belgium, Sweden, and the Netherlands.

We divide the sample into two sub-groups: firms with CEOs who have overseas work experience, overseas study experience, overseas permanent residence rights or foreign nationality, and firms with CEOs who have no overseas experience. The univariate test results in Panel A of Table 6 demonstrate significant differences in the CEO pay gap and CEO age between the two sub-groups. On average, CEOs with overseas experience are significantly younger than those without overseas experience, while the CEO pay gap is significantly larger in firms with CEOs who have overseas experience. For the regression results reported in Panel B of Table 6, we find that the coefficient on the interaction term between the pay gap and number of age cohorts is negative and significant in models (10) to (12) for firms with CEOs who have no overseas experience, while insignificant coefficient is observed on the interactions term in models (7) to (9) for firms with CEOs who have overseas experience. The findings confirm our hypothesis that the negative effect of age diversity on the tournament effect is less significant or even insignificant in firms where CEOs have overseas experience, as those firms are more Westernized and less influenced by Confucianism.

4.5 Does the impact of age diversity on the tournament effect vary by cultural regions?

As an ancient country, China encompasses diverse cultures, including Confucianism, Buddhism, Taoism and other regional cultures. Nonetheless, Confucianism is one of the most influential philosophies in China and has shaped the Chinese society (Fan, 2008). In China, Confucianism originated from the Shandong Province, from which it spread to other areas. Hence, the impact of Confucianism might vary upon region. Given its large population and huge land area, China can be divided into ten geographical cultural regions. In particular, the region of North China Plain (Shandong Province, Hebei Province, Henan Province, north of Anhui Province, north of Jiangsu Province, Beijing and Tianjin) is most influenced by the philosophy of Confucianism. Since the North China Plain region has a strong Confucianism

atmosphere, firms located in this region are more likely to be influenced by Confucianism. Therefore, we examine whether the negative impact of age diversity on the tournament effect varies between firms located in the North China Plain cultural region and the other regions.

In Panel A of Table 6, we find that, on average, firms located in the Confucian-oriented region (North China Plain region) have a significantly lower pay gap between the CEO and non-CEO executives. Panel B of Table 6 report the regression results for the North China Plain cultural region in models (16) to (18) and other regions in models (13) to (15). We find that the coefficient on interaction term between the pay gap and number of age cohorts is significant and negative for firms located in the North China Plain cultural region at the 1% level in all specifications. For firms located in other regions, the negative interaction term is significant at the 5% level when firm performance is measured by *ROA* and *ROE*. The magnitude of coefficient in models (16) and (17) is larger than models (13) and (14). The economic and statistical significance of the coefficient together suggest that the negative impact of age diversity among non-CEO executives is more significant in the North China Plain cultural region.

5 Robustness checks

5.1 Instrumental variables approach

In this section, we address the endogeneity concerns in our main models. In Equation (1), the relationship between the CEO pay gap and performance may be biased because of the possible correlation between independent variables and the error term. The CEO pay gap might act as a tournament incentive to motivate non-executives and consequently improve firm performance. Alternatively, firms that perform better may compensate their CEOs more than other subordinates, widening the pay gap. To address this potential endogeneity problem, we employ a fixed effect instrumental variable approach using Lewbel (2012) method, which includes internal and external instrumental variables. Following Kale et al. (2009) and Lin et

al. (2011), our main instrument variable is the average value of the CEO pay gap for other firms in the same industry and same region ($\text{Log}(\text{Pay gap})_{\text{industry}}$). The economic rationale is based on Murphy (1999) and Fisman and Svensson (2007) who argue that there are variations in compensation level and structure according to different industries and regions. The industry compensation structure may set the standard for all firms in that industry, and industry-level instruments are unlikely to affect individual firm performance.

Table 7 presents the results of fixed effect instrument variable approach of Equation (1). Consistent with Table 3, the coefficient of the pay gap is still positive and significant in all specifications. The LR statistics show that the external instrument in our study is relevant in all the specifications, while the Hansen J statistics indicates that the instrument satisfies validity criterion in the *ROA* and *ROE* specifications.

<Insert Table 7 about here>

In Equation (2), one may raise a concern on the endogeneity between the age diversity and firm performance, as poor performance may induce changes to the senior management team. The firm can replace the incumbent executive with an older executive who are more experienced. As a result, the age diversity of non-CEO executives will increase. To address this concern, we perform the fixed effects two-stage least squares (2SLS) estimation using Lewbel (2012) method for Equation (2). Considering that executive diversity can be affected by the diversity in the same industry and same region (e.g., Anderson et al., 2011 and Liu et al., 2014), we choose the average value of number of cohorts among non-CEO executives for other firms that are in the same industry and same region ($\text{Number of cohorts}_{\text{industry}}$) as the instrument variable for age diversity of non-CEO executives.

<Insert Table 8 about here>

Table 8 presents the results from estimating the fixed effect 2SLS of Equation (2). The instrument satisfies the relevance and validity criterion in all the specifications. Similar to Table 4, we also note that the coefficient of the interaction term is negative and significant in *ROA*, *ROE* and *EPS* specifications.

5.2 Performance persistence

Performance persistence is often a focus of corporate governance research (e.g., Goergen et al., 2015; Sila et al., 2016). The previous realization of the dependent variable might affect the current level of some independent variables. In our study, current CEO pay gap and current age diversity of non-CEO 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. Firms with worse past performance may replace the incumbent executive with an older executive, increasing the level of age diversity among non-CEO executives. To address these issues, we follow Wintoki et al. (2012) to employ the Dynamic Panel Data Generalized Method of Moments (GMM) estimator (Arellano and Bond, 1991), which accounts for unobserved heterogeneity as well as dynamic relation in our model. GMM regression results are reported in Table 9. All the independent variables are assumed to be endogenous except for the year dummies. The instruments used in the GMM estimation include the lagged differences (t-2) of endogenous variables and dependent variable for the level equation, and the lagged levels (t-3 to t-4) of the endogenous variables and dependent variable for the difference equation. Consistent with our main results, Table 9 reports significant positive effects of pay gap on firm performance in the *ROA* and *ROE* specifications. We also find that the coefficient of interaction term is negative and significant in the *ROA* and *ROE* specifications. Therefore, our previous results are not driven by the dynamic endogeneity problem.

<Insert Table 9 about here>

5.3 Age diversity and pay gap

One may argue that the age diversity of non-CEO executives (*Number of Cohorts*), might have an impact on *Pay Gap*, and thus indirectly affect firm performance through *Pay Gap*. To address this concern, we regress *Pay Gap* on *Number of Cohorts* and use the residuals that are unrelated with age diversity in Equation (2) without the interaction term and *Number of Cohorts*. In line with our previous results, we still find that *Log (Pay Gap)* is positively and significantly related with all firm performance measures in Table 10. Our finding rules out the possibility that age diversity has significant influence on pay gap.

<Insert Table 10 about here>

5.4 Alternative explanations and additional robustness

5.4.1 Family ownership

The organizational structure of family firms can be different from other firms due to “familism”. The controlling family may use narrow kinship networks in making hiring and promotion decisions (Bertrand and Schoar, 2006). Thus, the tournament competition and seniority may matter less in family firms. Here, we repeat our analysis in family and non-family firms. In Panel A of Table 11, family firms, on average, have significantly younger CEOs, lower pay gaps, and a higher level of age diversity among non-CEO executives. Consistent with our argument, in Panel B of Table 11, the coefficients of tournament incentives and the interaction term are not significant in family firms across all the specifications, while negative and significant coefficients of interaction term are found in non-family firms. This result suggests that the negative impact of age diversity on tournament effect only matters in non-family firms.

<Insert Table 11 about here>

5.4.2 Big city effects

Given the large population and broader development platforms, the competition is fiercer in large cities. One may argue that in a competitive environment, executives in big

cities compete more fervently with each other than those in small cities. Hence, our main result might be driven by the relationship between age diversity and tournament effect in big cities in China. To address this concern, we re-estimate Equation (2) by excluding Beijing and Shanghai from the sample. Table 12 shows that the pay gap is positively related with firm performance. Regarding the interaction term, the coefficient is negative and significant across all the specifications. This finding rules out the concern about big city effects and provides additional support for our hypothesis that the tournament effect is weaker when the non-CEO executives have heterogeneous ages.

<Insert Table 12 about here>

5.4.3 *Alternative measures of tournament incentive and age diversity*

We also conduct further analysis using alternative measures of tournament incentives and age diversity. Following Goergen et al. (2015), we replace the cohort composition measures with the age dissimilarity measure (*Age dissimilarity (>20)*) in models (1) to (3) in Table 13. In models (4) to (6), we employ the coefficient of variance (*CV*) of non-CEO executives' age as the age diversity measure. Similar to previous results, we find that the coefficient on interaction term is negative and statistically significant in all the specifications except model (3). The results confirm that non-CEO executives with mixed ages weaken the positive relationship between the pay gap between executives and firm performance, which is consistent with our hypothesis (H_2).

<Insert Table 13 about here>

Given the fact that the CEO is not the highest paid executive in some cases, following Chen et al. (2011), we employ the compensation difference between the highest paid executive and second highest paid executive (*Log (Pay Gap₁)*) to measure tournament incentives. We also use the compensation gap between the CEO and the mean value of other executives (*Log (Pay Gap₂)*) as another alternative measure. In Table 14, we note that *Log*

$(Pay\ Gap_1)$ and $Log(Pay\ Gap_2)$ are positively and significantly associated with firm performance. In addition, the coefficient on interaction term is negative and significant in all the specifications. These results are similar to our previous findings and support our hypothesis that the pay gap acts as a tournament incentive to motivate executives and increases firm performance and that age diversity among non-CEO executives weakens the tournament effect in Chinese firms.

<Insert Table 14 about here>

6 Conclusion

Using a comprehensive dataset of Chinese listed firms from 2005 to 2015, we find that the tournament incentives, measured as the pay difference between the CEO and the median value of non-CEO executives, is associated with better firm performance. Our empirical findings show that the tournament effects are negatively moderated by age diversity of non-CEO executives. In other words, the positive relationship between the pay gap and firm performance becomes stronger when the non-CEO executives are from the same age cohort, but the tournament effect is weaker for firms in which the non-CEO executives come from different age cohorts. We propose a seniority argument. In the Chinese society influenced by Confucianism, 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 older executives. Overall, our study highlights the important role that non-CEO executives' incentives play in determining the impact of tournament effects.

Our sub-sample analysis reveals that the negative moderation effect of age diversity on tournaments is more severe in state firms than in private firms, indicating that the importance of seniority for promotion is overemphasized in state firms. In addition, the negative influence of age diversity on the tournament effect is more pronounced in the North China

Plain cultural region, where the Confucianism atmosphere is strong. The negative effect of age diversity on tournament effect disappears in firms with CEOs who have overseas experience, as those firms are more Westernized and less influenced by Confucianism. These findings provide useful guidance for Chinese policymakers, regulators and corporate decision makers concerning executive compensation. The rank order tournament is an important incentive mechanism to motivate employees in Chinese firms. Our study provides interdisciplinary evidence that the age composition among non-CEO executives is important and that firms should consider adding executives with similar ages to their top management team in order to lower the generation gap, and thereby enhance firm performance.

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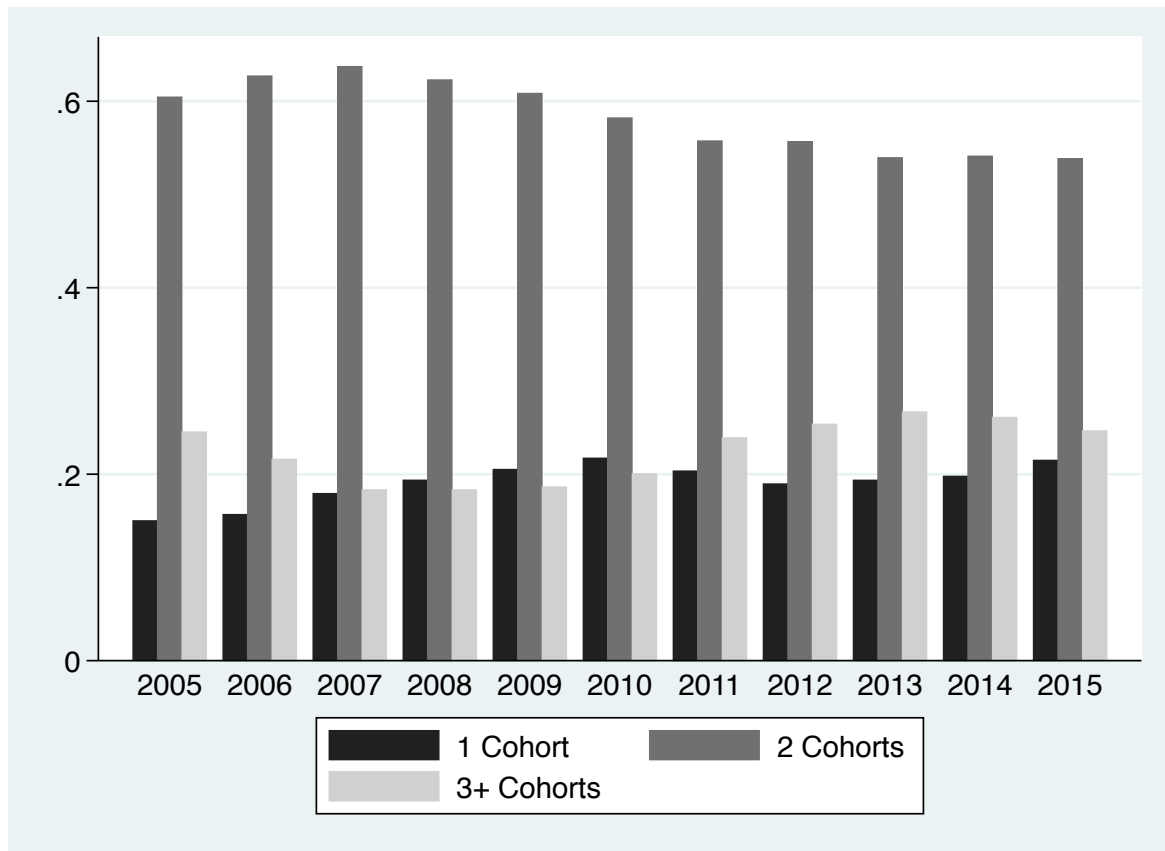
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Figure 1 Distribution of age cohorts composition for non-CEO executives in Chinese listed firms 2005-2015



Source: CSMAR (2005-2015)

This figure reports the percentage of firms with age cohorts composition for non-CEO executives in Chinese listed firms from 2005 to 2015. The executives are divided into four age cohorts based on their birth year: 1931-1947 cohort, 1948-1958 cohort, 1959-1974 cohort and 1975-1992 cohort. 1 Cohort means that non-CEO executives are in the same cohorts. 2 Cohorts means that non-CEO executives are from any two different age cohorts. 3+ Cohorts refers to that non-CEO executives are from any three or more age cohorts.

Table 1 Descriptive statistics

	Mean	Std	Lower quartile	Median	Upper quartile	Obs.
<i>Panel A: Firm performance</i>						
ROA	0.05	0.05	0.03	0.05	0.08	19,014
ROE	0.07	0.13	0.03	0.08	0.13	19,014
EPS	0.35	0.47	0.09	0.27	0.54	19,014
<i>Panel B: Tournament incentives (000s CNY)</i>						
Pay gap	194.20	427.26	40.00	101.30	220.06	19,014
Pay Gap ₁	155.30	414.01	18.90	60.00	150.00	19,014
Pay Gap ₂	185.38	409.29	36.25	103.03	214.30	19,014
<i>Panel C: Age difference in non-CEO executives</i>						
Number of Cohorts	2.05	0.69	2.00	2.00	2.00	19,014
2 Cohorts	0.57	0.49	0.00	1.00	1.00	19,014
3+ Cohorts	0.23	0.42	0.00	0.00	0.00	19,014
Age dissimilarity (>20)	0.32	0.47	0.00	0.00	1.00	19,014
CV	0.14	0.06	0.10	0.13	0.17	19,014
<i>Panel D: Other characteristics</i>						
Board size	8.99	1.83	8.00	9.00	9.00	18,914
Independent directors	0.37	0.05	0.33	0.33	0.40	18,914
Duality	0.21	0.41	0.00	0.00	0.00	19,014
Executives age	46.21	3.90	43.57	46.25	49.00	19,014
CEO age	47.97	6.43	44.00	48.00	52.00	19,014
Female executives	0.15	0.16	0.00	0.12	0.25	19,014
State	0.11	0.20	0.00	0.00	0.14	19,014
Foreign	0.01	0.07	0.00	0.00	0.00	19,014
Leverage	0.45	0.21	0.28	0.46	0.62	19,014
Firm size	21.79	1.27	20.90	21.62	22.45	19,014
Firm age	8.99	5.97	3.64	8.57	13.71	19,014

This table reports descriptive statistics on main variables for Chinese listed firms from 2005 to 2015. *ROA* is the ratio of the firm's net income to total assets. *ROE* is defined as the firm's net income divided by book value of total equity. *EPS* is the difference between net income and dividends on preferred stock divided by average outstanding shares. *Pay gap* is the compensation gap between CEO and the median value of the non-CEO executives. *Pay Gap₁* is the compensation gap between the highest and second highest paid executive. *Pay Gap₂* is the compensation gap between CEO and the mean value of the non-CEO executives. *Number of cohorts* is the number of age cohorts among non-CEO executives. *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. *Age dissimilarity (>20)* equals to one if the age spread among non-CEO executives is larger than 20 and zero otherwise. *CV* is standard deviation of non-CEO executives ages divided by the mean age of non-CEO executives. *Board Size* is the natural logarithm of the number of board directors. *Independent directors* is the percentage of independent directors. *Duality* is a dummy variable which equals one if the CEO is also the chairman and zero otherwise. *Female Executives* is the percentage of female executives. *CEO age* is the natural logarithm of the CEO age. *Executives Age* is the average age of non-CEO executives. *State* is the proportions of shares owned by state-owned enterprises/central/local governments. *Foreign* is the proportions of shares owned by foreign investors. *Private* is the proportions of shares owned by a private investor. *Firm size* is the natural logarithm of total assets. *Leverage* is defined as the ratio of debt to total assets. *Firm age* is the natural logarithm of the number of years since the initial public offering.

Table 2 Correlation of main variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.ROA	1.000															
2.ROE	0.849	1.000														
3.EPS	0.761	0.748	1.000													
4.Pay gap	0.127	0.152	0.200	1.000												
5.Number of Cohorts	0.013	0.015	0.021	0.036	1.000											
6.Executives age	-0.033	-0.014	0.020	0.016	0.178	1.000										
7.Duality	0.056	0.026	0.045	0.074	-0.044	-0.159	1.000									
8.Independent directors	-0.014	-0.004	-0.004	0.003	0.003	-0.017	0.101	1.000								
9.State	-0.012	0.008	-0.020	-0.105	-0.051	0.021	-0.153	-0.098	1.000							
10.Foreign	0.058	0.038	0.048	0.035	0.043	-0.021	0.039	0.0110	-0.055	1.000						
11.Female executives	0.022	0.013	-0.002	0.072	0.024	-0.119	0.112	0.032	-0.107	0.0120	1.000					
12.Board size	0.017	0.027	0.049	0.021	0.008	0.121	-0.167	-0.416	0.196	-0.025	-0.095	1.000				
13.CEO age	-0.004	0.008	0.032	0.098	-0.039	0.250	0.155	0.026	0.009	0.006	-0.007	0.043	1.000			
14.Leverage	-0.300	-0.194	-0.181	0.011	-0.017	0.090	-0.181	-0.031	0.130	-0.098	-0.098	0.166	0.009	1.000		
15.Firm age	-0.234	-0.148	-0.202	0.020	-0.046	0.199	-0.222	-0.029	0.027	-0.184	-0.016	0.076	0.064	0.415	1.000	
16.Firm size	0.049	0.144	0.249	0.193	0.014	0.286	-0.141	0.047	0.087	-0.049	-0.132	0.246	0.154	0.419	0.270	1.000

This table shows the correlation matrix of main variables. *ROA* is the net income divided by total assets. *ROE* is the net income to book value of total equity. *EPS* is the difference between net income and dividends on preferred stock to average outstanding shares. *Pay gap* is the compensation gap between CEO and the median value of the non-CEO executives. *Number of cohorts* is the number of age cohorts among non-CEO executives. *Board Size* is the natural logarithm of the number of board directors. *Independent Directors* is the percentage of independent directors. *Duality* is a dummy variable which equals one if the CEO is also the chairman and zero otherwise. *Female Executives* is the percentage of female executives. *CEO Age* is the natural logarithm of the CEO age. *Executives Age* is the average age of non-CEO executives. *State* is the proportions of shares owned by state-owned enterprises/central/local governments. *Foreign* is the proportions of shares owned by foreign investors. *Private* is the proportions of shares owned by a private investor. *Firm size* is the natural logarithm of total assets. *Leverage* is defined as the ratio of debt to total assets. *Firm Age* is the natural logarithm of the number of years since the initial public offering. Figures in bold are significant at 5% level.

Table 3 Pay gap and firm performance

	ROA	ROE	EPS
	(1)	(2)	(3)
Log (Pay gap)	0.020*** (0.006)	0.056*** (0.015)	0.226*** (0.065)
Executives age	-0.008 (0.011)	-0.041 (0.030)	-0.071 (0.090)
Duality	-0.001 (0.002)	-0.005 (0.005)	-0.001 (0.016)
Independent directors	-0.002 (0.015)	0.003 (0.038)	-0.027 (0.132)
State	0.015*** (0.003)	0.044*** (0.009)	0.087** (0.034)
Foreign	0.002 (0.009)	0.005 (0.023)	-0.008 (0.078)
Female executives	-0.000 (0.005)	-0.005 (0.013)	-0.010 (0.042)
Board size	-0.009 (0.005)	-0.025* (0.015)	-0.082 (0.051)
CEO age	0.001 (0.005)	0.015 (0.014)	-0.049 (0.044)
Leverage	0.023*** (0.006)	0.074*** (0.016)	0.060 (0.048)
Firm age	-0.001** (0.001)	-0.001 (0.002)	-0.061*** (0.007)
Firm size	-0.012*** (0.002)	-0.027*** (0.005)	-0.024* (0.014)
Year dummies	Yes	Yes	Yes
Obs.	15,448	15,448	15,448
R2	0.060	0.047	0.051

The table presents fixed effect regressions of firm performance on pay gap. The dependent variables are firm performance measured as *ROA*, *ROE* and *EPS*. *Log (Pay gap)* is the natural logarithm of the compensation gap between CEO and the median value of the non-CEO executives. *Board size* is the natural logarithm of the number of board directors. *Independent directors* is the percentage of independent directors. *Duality* is a dummy variable which equals one if the CEO is also the chairman and zero otherwise. *Female executives* is the percentage of female executives. *CEO age* is the natural logarithm of the CEO age. *Executives age* is the average age of non-CEO executives. *State* is the proportions of shares owned by state-owned enterprises/central/local governments. *Foreign* is the proportions of shares owned by foreign investors. *Private* is the proportions of shares owned by a private investor. *Firm size* is the natural logarithm of total assets. *Leverage* is defined as the ratio of debt to total assets. *Firm age* is the natural logarithm of the number of years since the initial public offering. All the independent variables are one year lagged. Constants 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 4 Age diversity, pay gap and firm performance

	ROA	ROE	EPS
	(1)	(2)	(3)
Log (Pay gap)	0.065*** (0.015)	0.155*** (0.039)	0.595*** (0.163)
Number of cohorts	0.171*** (0.047)	0.376*** (0.122)	1.382*** (0.509)
Log (Pay gap) * Number of cohorts	-0.021*** (0.006)	-0.047*** (0.015)	-0.173*** (0.064)
Executives age	-0.009 (0.012)	-0.043 (0.030)	-0.074 (0.091)
Duality	-0.001 (0.002)	-0.005 (0.005)	-0.001 (0.016)
Independent directors	-0.002 (0.015)	0.005 (0.038)	-0.020 (0.132)
State	0.015*** (0.003)	0.044*** (0.009)	0.088*** (0.034)
Foreign	0.002 (0.009)	0.005 (0.023)	-0.008 (0.078)
Female executives	-0.001 (0.005)	-0.005 (0.013)	-0.011 (0.043)
Board size	-0.009 (0.005)	-0.025* (0.015)	-0.082 (0.051)
CEO age	0.001 (0.005)	0.015 (0.014)	-0.049 (0.043)
Leverage	0.023*** (0.006)	0.074*** (0.016)	0.061 (0.048)
Firm age	-0.002** (0.001)	-0.002 (0.002)	-0.061*** (0.007)
Firm size	-0.012*** (0.002)	-0.027*** (0.005)	-0.025* (0.015)
Year dummies	Yes	Yes	Yes
Obs.	15,448	15,448	15,448
R2	0.061	0.047	0.052

The table presents fixed effect regressions of firm performance on pay gap and the interaction between pay gap and age diversity. The dependent variables are firm performance measured as *ROA*, *ROE* and *EPS*. *Log (Pay gap)* is the natural logarithm of the compensation gap between CEO and the median value of the non-CEO executives. *Number of cohorts* is the number of age cohorts among non-CEO executives. *Board Size* is the natural logarithm of the number of board directors. *Independent directors* is the percentage of independent directors. *Duality* is a dummy variable which equals one if the CEO is also the chairman and zero otherwise. *Female Executives* is the percentage of female executives. *CEO age* is the natural logarithm of the CEO age. *Executives Age* is the average age of non-CEO executives. *State* is the proportions of shares owned by state-owned enterprises/central/local governments. *Foreign* is the proportions of shares owned by foreign investors. *Private* is the proportions of shares owned by a private investor. *Firm size* is the natural logarithm of total assets. *Leverage* is defined as the ratio of debt to total assets. *Firm age* is the natural logarithm of the number of years since the initial public offering. All the independent variables are one year lagged. Constants 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 5 Age diversity, pay gap and firm performance (Cohort dummies)

	ROA	ROE	EPS
	(1)	(2)	(3)
Log (Pay gap)	0.057*** (0.011)	0.147*** (0.032)	0.503*** (0.128)
2 Cohorts	0.312*** (0.096)	0.820*** (0.249)	2.309** (1.050)
3+ Cohorts	0.428*** (0.100)	0.973*** (0.270)	3.252*** (1.144)
Log (Pay gap) * 2 Cohorts	-0.039*** (0.012)	-0.103*** (0.031)	-0.289** (0.132)
Log (Pay gap) * 3+ Cohorts	-0.054*** (0.013)	-0.122*** (0.034)	-0.408*** (0.144)
Executives age	-0.010 (0.012)	-0.044 (0.030)	-0.078 (0.090)
Duality	-0.001 (0.002)	-0.005 (0.005)	-0.001 (0.016)
Independent directors	-0.001 (0.015)	0.006 (0.038)	-0.018 (0.132)
State	0.015*** (0.003)	0.044*** (0.009)	0.088** (0.034)
Foreign	0.002 (0.009)	0.005 (0.023)	-0.007 (0.078)
Female executives	-0.000 (0.005)	-0.005 (0.013)	-0.010 (0.043)
Board size	-0.009 (0.005)	-0.025* (0.015)	-0.081 (0.051)
CEO age	0.001 (0.005)	0.015 (0.014)	-0.049 (0.043)
Leverage	0.023*** (0.006)	0.075*** (0.016)	0.062 (0.048)
Firm age	-0.002** (0.001)	-0.002 (0.002)	-0.061*** (0.007)
Firm size	-0.013*** (0.002)	-0.028*** (0.005)	-0.026* (0.015)
Year dummies	Yes	Yes	Yes
Obs.	15,448	15,448	15,448
R2	0.062	0.048	0.053

The table presents fixed effect regressions of firm performance on pay gap and dummy variables for different age cohorts. The dependent variables are firm performance measured as *ROA*, *ROE* and *EPS*. *Log (Pay gap)* the natural logarithm of the compensation gap between CEO and the median value of the non-CEO executives. *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. *Board size* is the natural logarithm of the number of board directors. *Independent directors* is the percentage of independent directors. *Duality* is a dummy variable which equals one if the CEO is also the chairman and zero otherwise. *Female Executives* is the percentage of female executives. *CEO age* is the natural logarithm of CEO age. *Executives age* is the average age of non-CEO executives. *State* is the proportions of shares owned by state-owned enterprises/central/local governments. *Foreign* is the proportions of shares owned by foreign investors. *Private* is the proportions of shares owned by a private investor. *Firm size* is the natural logarithm of total assets. *Leverage* is defined as the ratio of debt to total assets. *Firm age* is the natural logarithm of the number of years since initial public offering. All the independent variables are one year lagged. 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 6 Subgroup analysis: Age diversity, pay gap and firm performance

<i>Panel A: Descriptive statistics</i>																	
	Non-state firms (N=13,936)		State firms (N=5,078)			CEOs with overseas experience (N=1,030)			CEOs without overseas experience (N=16,998)			Other regions (N=15,218)		North China Plain region (N=3,796)			
	Mean	Std	Mean	Std	P-value	Mean	Std		Mean	Std	P-value	Mean	Std	Mean	Std	P-value	
Pay gap	217.561	470.892	130.078	263.462	0.000	332.754	672.475		188.738	412.995	0.000	199.594	441.837	172.574	362.230	0.000	
No. of cohorts	2.072	0.711	2.000	0.607	0.000	2.052	0.685		2.053	0.685	0.979	2.053	0.691	2.050	0.665	0.803	
CV	0.141	0.058	0.127	0.048	0.000	0.144	0.060		0.136	0.055	0.000	0.138	0.056	0.133	0.054	0.000	
Dissimilarity	0.344	0.475	0.255	0.436	0.000	0.360	0.480		0.316	0.465	0.003	0.321	0.467	0.317	0.465	0.580	
CEO age	47.912	6.683	48.138	5.663	0.032	46.752	7.903		48.032	6.317	0.000	47.953	6.498	48.050	6.132	0.404	

<i>Panel B: Age diversity, pay gap and firm performance</i>																		
	Non-state firms			State firms			CEOs with overseas experience			CEOs without overseas experience			Other regions			North China Plain region		
	ROA	ROE	EPS	ROA	ROE	EPS	ROA	ROE	EPS	ROA	ROE	EPS	ROA	ROE	EPS	ROA	ROE	EPS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Log (Pay gap)	0.038**	0.080**	0.254	0.104***	0.212**	0.968**	0.007	0.010	0.071	0.071***	0.179***	0.687***	0.056***	0.141***	0.499***	0.125***	0.258***	1.081***
	(0.016)	(0.034)	(0.157)	(0.036)	(0.089)	(0.390)	(0.051)	(0.078)	(0.318)	(0.016)	(0.043)	(0.180)	(0.017)	(0.046)	(0.184)	(0.031)	(0.071)	(0.335)
No. of cohorts	0.101*	0.185	0.349	0.247**	0.467*	2.621**	0.073	0.146	0.534	0.182***	0.429***	1.592***	0.141**	0.321**	0.960	0.346***	0.697***	3.143***
	(0.052)	(0.115)	(0.518)	(0.110)	(0.275)	(1.200)	(0.159)	(0.255)	(0.976)	(0.053)	(0.138)	(0.575)	(0.056)	(0.146)	(0.593)	(0.085)	(0.207)	(0.942)
Log (Pay gap) * No. of cohorts	-0.013*	-0.023	-0.044	-0.031**	-0.060*	-0.329**	-0.010	-0.020	-0.073	-0.023***	-0.054***	-0.200***	-0.018**	-0.040**	-0.120	-0.044***	-0.088***	-0.398***
	(0.006)	(0.014)	(0.065)	(0.014)	(0.034)	(0.151)	(0.020)	(0.032)	(0.122)	(0.007)	(0.017)	(0.072)	(0.007)	(0.018)	(0.074)	(0.011)	(0.026)	(0.118)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	11,606	11,606	11,606	3,842	3,842	3,842	815	815	815	13,884	13,884	13,884	12,371	12,371	12,371	3,077	3,077	3,077
R2	0.065	0.051	0.064	0.064	0.050	0.053	0.139	0.139	0.144	0.061	0.046	0.050	0.064	0.048	0.051	0.070	0.065	0.082

This table reports the subgroup analysis by state ownership, CEO overseas experience and cultural regions. Panel A presents the difference in summary statistics between non-state firms and state firms, between firms with CEOs who have overseas experience and firms with CEOs who have no overseas experience, and between firms located in the North China Plain region and firms located in other regions. The mean, standard deviation, the number of observations for sub-groups, and the p-value of the mean difference test are reported in Panel A, respectively. Panel B represents fixed effect regressions of firm performance on pay gap and the interaction between pay gap and age diversity for subgroups. The dependent variables are firm performance measured as *ROA*, *ROE* and *EPS*. *Log (Pay gap)* is the natural logarithm of the compensation difference between CEO and the median value of the non-CEO executives. *Number of cohorts* is the number of age cohorts among non-CEO executives. All the independent variables are one year lagged. For the sake of saving space, control variables 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 7 Age diversity, pay gap and performance (Fe instrument variable approach)

	ROA	ROE	EPS
	(1)	(2)	(3)
Log (Pay gap)	0.015* (0.008)	0.071*** (0.023)	0.430*** (0.097)
Executives age	-0.014 (0.009)	-0.052** (0.025)	-0.096 (0.070)
Duality	-0.001 (0.002)	-0.006 (0.005)	-0.007 (0.013)
Independent directors	-0.002 (0.013)	0.005 (0.033)	-0.021 (0.106)
State	0.013*** (0.003)	0.037*** (0.008)	0.070*** (0.025)
Foreign	0.004 (0.009)	0.006 (0.022)	-0.006 (0.067)
Female executives	-0.001 (0.005)	-0.005 (0.012)	-0.011 (0.034)
Board size	-0.012** (0.005)	-0.034*** (0.013)	-0.108*** (0.039)
CEO age	0.000 (0.005)	0.010 (0.013)	-0.077** (0.036)
Leverage	0.025*** (0.005)	0.080*** (0.015)	0.066* (0.040)
Firm age	-0.002** (0.001)	-0.001 (0.001)	-0.060*** (0.005)
Firm size	-0.013*** (0.002)	-0.029*** (0.004)	-0.034*** (0.012)
Year dummies	Yes	Yes	Yes
Obs.	14,436	14,436	14,436
LR statistics (p-value)	0.000	0.000	0.000
Hansen statistics (p-value)	0.466	0.240	0.014

The table presents fixed effect instrument variable approach results of firm performance on pay gap. The dependent variables are firm performance measured as *ROA*, *ROE* and *EPS*. *Log (Pay gap)* is the natural logarithm of the compensation difference between CEO and the median value of the non-CEO executives. The instrumental variables for *Log (Pay gap)* is the median value of compensation gap for the firm in the same industry as the firm, the number of non-CEO executives and new CEO. *Number of cohorts* is the number of age cohorts among non-CEO executives. *Board size* is the natural logarithm of the number of board directors. *Independent directors* is the percentage of independent directors. *Duality* is a dummy variable which equals one if the CEO is also the chairman and zero otherwise. *Female Executives* is the percentage of female executives. *CEO Age* is the natural logarithm of CEO age. *Executives Age* is the average age of non-CEO executives. *State* is the proportions of shares owned by state-owned enterprises/central/local governments. *Foreign* is the proportions of shares owned by foreign investors. *Private* is the proportions of shares owned by a private investor. *Firm size* is the natural logarithm of total assets. *Leverage* is defined as the ratio of debt to total assets. *Firm age* is the natural logarithm of the number of years since initial public offering. The robust standard errors are reported in parentheses. *, **, *** indicate statistical significance level at 10%, 5%, and 1%, respectively.

Table 8 Age diversity, pay gap and performance (Fe instrument variable approach)

	ROA	ROE	EPS
	(1)	(2)	(3)
Log (Pay gap)	0.052*** (0.015)	0.135*** (0.041)	0.559*** (0.154)
Number of cohorts	0.111** (0.051)	0.269** (0.137)	1.077** (0.501)
Log (Pay gap) * Number of cohorts	-0.014** (0.006)	-0.035** (0.017)	-0.144** (0.063)
Executives age	-0.005 (0.011)	-0.031 (0.030)	0.022 (0.083)
Duality	-0.002 (0.002)	-0.007 (0.005)	-0.014 (0.014)
Independent directors	-0.002 (0.013)	0.005 (0.033)	-0.020 (0.107)
State	0.014*** (0.003)	0.039*** (0.008)	0.084*** (0.026)
Foreign	0.003 (0.009)	0.006 (0.022)	-0.012 (0.067)
Female directors	-0.000 (0.005)	-0.004 (0.012)	-0.000 (0.035)
Board size	-0.012** (0.005)	-0.033** (0.013)	-0.104*** (0.039)
CEO age	-0.001 (0.005)	0.009 (0.013)	-0.075** (0.036)
Leverage	0.025*** (0.005)	0.080*** (0.015)	0.062 (0.040)
Firm age	-0.001** (0.001)	-0.001 (0.001)	-0.060*** (0.006)
Firm size	-0.013*** (0.002)	-0.028*** (0.004)	-0.027** (0.012)
Year dummies	Yes	Yes	Yes
Obs.	14,436	14,436	14,436
LR statistics (p-value)	0.000	0.000	0.000
Hansen statistics (p-value)	0.200	0.240	0.143

The table presents fixed effect instrument variable approach results of firm performance on pay gap and the interaction between pay gap and age diversity. The dependent variables are firm performance measured as *ROA*, *ROE* and *EPS*. *Log (Pay gap)* is the natural logarithm of the compensation difference between CEO and the median value of the non-CEO executives. *Number of cohorts* is the number of age cohorts among non-CEO executives. The instrumental variables for *Number of cohorts* is the average value of number of cohorts in other firms that are in the same industry, the same region and similar size as the firm (*Number of cohorts_{industry}*). *Board size* is the natural logarithm of the number of board directors. *Independent directors* is the percentage of independent directors. *Duality* is a dummy variable which equals one if the CEO is also the chairman and zero otherwise. *Female Executives* is the percentage of female executives. *CEO age* is the natural logarithm of CEO age. *Executives age* is the average age of non-CEO executives. *State* is the proportions of shares owned by state-owned enterprises/central/local governments. *Foreign* is the proportions of shares owned by foreign investors. *Private* is the proportions of shares owned by a private investor. *Firm size* is the natural logarithm of total assets. *Leverage* is defined as the ratio of debt to total assets. *Firm age* is the natural logarithm of the number of years since initial public offering. The robust standard errors are reported in parentheses. *, **, *** indicate statistical significance level at 10%, 5%, and 1%, respectively.

Table 9 Age diversity, pay gap and firm performance (System GMM)

	ROA	ROE	EPS
	(1)	(2)	(3)
ROA_{t-1}	0.629*** (0.118)		
ROE_{t-1}		0.808*** (0.159)	
EPS_{t-1}			0.853*** (0.072)
Log (Pay gap)	0.357** (0.177)	0.755* (0.400)	0.978 (0.926)
Number of cohorts	1.235* (0.656)	2.590* (1.472)	3.428 (3.289)
Log (Pay gap) * Number of cohorts	-0.153* (0.082)	-0.322* (0.184)	-0.425 (0.412)
Executives age	0.068 (0.072)	0.136 (0.163)	0.192 (0.365)
Duality	0.029 (0.018)	0.019 (0.040)	0.061 (0.101)
Independent directors	-0.009 (0.088)	-0.051 (0.215)	-0.171 (0.545)
State	0.109 (0.078)	0.431** (0.176)	0.974** (0.474)
Foreign	-0.513** (0.218)	-1.312*** (0.485)	-2.719** (1.259)
Female executives	0.013 (0.034)	-0.018 (0.087)	-0.124 (0.193)
Board size	0.001 (0.037)	-0.068 (0.084)	-0.095 (0.205)
CEO age	-0.002 (0.050)	0.011 (0.139)	0.032 (0.276)
Leverage	-0.048* (0.025)	-0.124** (0.057)	-0.160 (0.154)
Firm age	0.002 (0.004)	0.001 (0.010)	0.029 (0.026)
Firm size	0.003 (0.004)	0.002 (0.013)	-0.008 (0.026)
Year dummies	Yes	Yes	Yes
Obs.	15,459	15,459	15,459
AR (2) (p-value)	0.582	0.176	0.402
Hansen test (p-value)	0.176	0.395	0.892

The table presents the system GMM regression of firm performance on pay gap and the interaction between pay gap and age diversity. The dependent variables are firm performance measured as ROA , ROE and EPS . Log ($Pay\ gap$) is the natural logarithm of the compensation difference between CEO and the median value of the non-CEO executives. $Number\ of\ cohorts$ is the number of age cohorts among non-CEO executives. $Board\ Size$ is the natural logarithm of the number of board directors. $Independent\ directors$ is the percentage of independent directors. $Duality$ is a dummy variable which equals one if the CEO is also the chairman and zero otherwise. $Female\ Executives$ is the percentage of female executives. $CEO\ age$ is the natural logarithm of CEO age. $Executives\ age$ is the average age of non-CEO executives. $State$ is the proportions of shares owned by state-owned enterprises/central/local governments. $Foreign$ is the proportions of shares owned by foreign investors. $Private$ is the proportions of shares owned by a private investor. $Firm\ size$ is the natural logarithm of total assets. $Leverage$ is defined as the ratio of debt to total assets. $Firm\ age$ is the natural logarithm of the number of years since initial public offering. All the independent variables are not lagged (except ROA_{t-1} , ROE_{t-1} and EPS_{t-1}). 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 10 Pay gap and firm performance: Residualized pay gap

	ROA	ROE	EPS
	(1)	(2)	(3)
Log (Pay Gap) <i>residualized</i>	0.020*** (0.006)	0.055*** (0.015)	0.226*** (0.065)
Executives age	-0.008 (0.011)	-0.040 (0.030)	-0.068 (0.090)
Duality	-0.001 (0.002)	-0.005 (0.005)	-0.001 (0.016)
Independent directors	-0.002 (0.015)	0.003 (0.038)	-0.027 (0.132)
State	0.015*** (0.003)	0.044*** (0.009)	0.088** (0.034)
Foreign	0.002 (0.009)	0.005 (0.023)	-0.008 (0.078)
Female directors	-0.000 (0.005)	-0.005 (0.013)	-0.010 (0.042)
Board size	-0.009 (0.005)	-0.025* (0.015)	-0.082 (0.051)
CEO age	0.001 (0.005)	0.015 (0.014)	-0.049 (0.044)
Leverage	0.023*** (0.006)	0.074*** (0.016)	0.060 (0.048)
Firm age	-0.001** (0.001)	-0.001 (0.002)	-0.061*** (0.007)
Firm size	-0.012*** (0.002)	-0.027*** (0.005)	-0.024* (0.014)
Year dummies	Yes	Yes	Yes
Obs.	15,448	15,448	15,448
R2	0.060	0.047	0.051

The table presents fixed effect regressions of firm performance on residualized pay gap. The dependent variables are firm performance measured as *ROA*, *ROE* and *EPS*. *Log (Pay Gap) residualized* is the natural logarithm of the residualised compensation gap between CEO and the median value of the non-CEO executives. *Board Size* is the natural logarithm of the number of board directors. *Independent Directors* is the percentage of independent directors. *Duality* is a dummy variable which equals one if the CEO is also the chairman and zero otherwise. *Female Executives* is the percentage of female executives. *CEO Age* is the natural logarithm of the CEO age. *Executives age* is the average age of non-CEO executives. *State* is the proportions of shares owned by state-owned enterprises/central/local governments. *Foreign* is the proportions of shares owned by foreign investors. *Private* is the proportions of shares owned by a private investor. *Firm size* is the natural logarithm of total assets. *Leverage* is defined as the ratio of debt to total assets. *Firm age* is the natural logarithm of the number of years since the initial public offering. All the independent variables are one year lagged. Constants 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 11 Family firms vs. non-family firms

<i>Panel A: Descriptive statistics</i>						
	Non-family firms (N=16,119)		Family firms (N=2,895)			
	Mean	Std	Mean	Std	P-value	
	(1)	(2)	(3)	(4)	(5)	
Pay gap	197.054	430.514	178.311	408.371	0.030	
Number of cohorts	2.043	0.678	2.107	0.725	0.000	
CV	0.135	0.054	0.148	0.060	0.000	
Dissimilarity (>20 years)	0.310	0.462	0.379	0.485	0.000	
CEO age	48.118	6.366	47.162	6.701	0.000	
<i>Panel B: Age diversity, pay gap and firm performance</i>						
	Non-family firms			Family firms		
	ROA	ROE	EPS	ROA	ROE	EPS
	(1)	(2)	(3)	(4)	(5)	(6)
Log (Pay gap)	0.065*** (0.016)	0.163*** (0.042)	0.644*** (0.176)	0.075 (0.051)	0.104 (0.105)	0.373 (0.409)
Number of cohorts	0.171*** (0.050)	0.386*** (0.133)	1.541*** (0.551)	0.159 (0.132)	0.243 (0.286)	0.354 (1.156)
Log (Pay gap) * Number of cohorts	-0.021*** (0.006)	-0.048*** (0.017)	-0.193*** (0.069)	-0.020 (0.017)	-0.031 (0.036)	-0.047 (0.145)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	13,288	13,288	13,288	2,160	2,160	2,160
R2	0.064	0.050	0.045	0.084	0.074	0.180

This table reports the subgroup analysis by family ownership. Panel A presents the difference in summary statistics between non-family firms and family firms. Panel B represents fixed effect regressions of firm performance on pay gap and the interaction between pay gap and age diversity for family firms and non-family firms. The dependent variables are firm performance measured as *ROA*, *ROE* and *EPS*. *Log (Pay gap)* is the natural logarithm of the compensation difference between CEO and the median value of the non-CEO executives. *Number of cohorts* is the number of age cohorts among non-CEO executives. All the independent variables are one year lagged. For the sake of saving space, control variables 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 12 Age diversity, pay gap and firm performance (excluding big cities)

	ROA	ROE	EPS
	(1)	(2)	(3)
Log (Pay gap)	0.062*** (0.017)	0.165*** (0.046)	0.593*** (0.188)
Number of cohorts	0.156*** (0.055)	0.380*** (0.144)	1.262** (0.612)
Log (Pay gap) * Number of cohorts	-0.020*** (0.007)	-0.048*** (0.018)	-0.158** (0.077)
Executives age	-0.004 (0.013)	-0.033 (0.034)	-0.024 (0.103)
Duality	-0.001 (0.002)	-0.006 (0.006)	-0.009 (0.018)
Independent directors	-0.002 (0.017)	0.003 (0.044)	-0.001 (0.147)
State	0.019*** (0.004)	0.054*** (0.011)	0.144*** (0.039)
Foreign	0.001 (0.010)	-0.003 (0.024)	0.031 (0.086)
Female executives	0.003 (0.006)	-0.003 (0.015)	0.021 (0.047)
Board size	-0.005 (0.006)	-0.014 (0.016)	-0.047 (0.058)
CEO age	-0.000 (0.006)	0.015 (0.015)	-0.043 (0.046)
Leverage	0.024*** (0.006)	0.069*** (0.018)	0.068 (0.052)
Firm age	-0.002** (0.001)	-0.002 (0.002)	-0.063*** (0.007)
Firm size	-0.013*** (0.002)	-0.029*** (0.005)	-0.038** (0.016)
Year dummies	Yes	Yes	Yes
Obs.	13,068	13,068	13,068
R2	0.066	0.049	0.058

The table presents fixed effect regressions of firm performance on pay gap and the interaction between pay gap and age diversity excluding big cities (Beijing and Shanghai). The dependent variables are firm performance measured as *ROA*, *ROE* and *EPS*. *Log (Pay gap)* is the natural logarithm of the compensation difference between CEO and the median value of the non-CEO executives. *Number of cohorts* is the number of age cohorts among non-CEO executives. *Board size* is the natural logarithm of the number of board directors. *Independent Directors* is the percentage of independent directors. *Duality* is a dummy variable which equals one if the CEO is also the chairman and zero otherwise. *Female executives* is the percentage of female executives. *CEO age* is the natural logarithm of CEO age. *Executives age* is the average age of non-CEO executives. *State* is the proportions of shares owned by state-owned enterprises/central/local governments. *Foreign* is the proportions of shares owned by foreign investors. *Private* is the proportions of shares owned by a private investor. *Firm size* is the natural logarithm of total assets. *Leverage* is defined as the ratio of debt to total assets. *Firm age* is the natural logarithm of the number of years since initial public offering. All the independent variables are one year lagged. 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 13 Age diversity, pay gap and firm performance: Alternative age diversity measures

	Age dissimilarity (>20 years)			CV		
	ROA	ROE	EPS	ROA	ROE	EPS
	(1)	(2)	(3)	(4)	(5)	(6)
Log (Pay gap)	0.028*** (0.007)	0.069*** (0.018)	0.272*** (0.077)	0.048*** (0.015)	0.119*** (0.040)	0.457*** (0.158)
Age dissimilarity (>20)	0.156** (0.068)	0.278* (0.143)	0.888 (0.693)			
Log (Pay gap) * Age dissimilarity (>20)	-0.020** (0.008)	-0.035* (0.018)	-0.112 (0.087)			
CV				1.671** (0.745)	3.876** (1.923)	13.825* (7.647)
Log (Pay gap) *CV				-0.209** (0.093)	-0.482** (0.241)	-1.730* (0.960)
Executives age	-0.008 (0.011)	-0.042 (0.030)	-0.065 (0.091)	-0.009 (0.011)	-0.043 (0.030)	-0.076 (0.090)
Duality	-0.001 (0.002)	-0.005 (0.005)	-0.002 (0.016)	-0.001 (0.002)	-0.004 (0.005)	-0.001 (0.016)
Independent directors	-0.002 (0.015)	0.003 (0.038)	-0.026 (0.132)	-0.002 (0.015)	0.004 (0.038)	-0.026 (0.132)
State	0.015*** (0.003)	0.043*** (0.009)	0.088** (0.034)	0.016*** (0.003)	0.044*** (0.009)	0.088*** (0.034)
Foreign	0.003 (0.009)	0.006 (0.023)	-0.006 (0.078)	0.003 (0.009)	0.006 (0.023)	-0.003 (0.078)
Female directors	-0.001 (0.005)	-0.005 (0.013)	-0.011 (0.042)	-0.000 (0.005)	-0.005 (0.013)	-0.010 (0.043)
Board size	-0.009* (0.005)	-0.025* (0.015)	-0.083 (0.051)	-0.009 (0.005)	-0.025* (0.015)	-0.082 (0.051)
CEO age	0.001 (0.005)	0.015 (0.014)	-0.049 (0.044)	0.001 (0.005)	0.015 (0.014)	-0.047 (0.044)
Leverage	0.023*** (0.006)	0.074*** (0.016)	0.061 (0.048)	0.023*** (0.006)	0.074*** (0.016)	0.061 (0.048)
Firm age	-0.001** (0.001)	-0.001 (0.002)	-0.061*** (0.007)	-0.001** (0.001)	-0.001 (0.002)	-0.061*** (0.007)
Firm size	-0.012*** (0.002)	-0.027*** (0.005)	-0.024* (0.014)	-0.012*** (0.002)	-0.027*** (0.005)	-0.025* (0.015)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	15,448	15,448	15,448	15,448	15,448	15,448
R2	0.061	0.047	0.052	0.061	0.047	0.052

The table presents the fixed effect regressions of firm performance on pay gap and the interaction between pay gap and age diversity, with alternative age diversity measures. The dependent variables are firm performance measured as *ROA*, *ROE* and *EPS*. In columns (1) to (3), age diversity is measured by *Age dissimilarity (>20)*, a dummy variable that equals to one if the age spread among non-CEO executives is larger than 20 and zero otherwise. In columns (4) to (6), age diversity is measured by CV, defined as standard deviation of non-CEO executives ages divided by the mean age of non-CEO executives. *Log (Pay gap)* is the natural logarithm of the compensation difference between CEO and the median value of the non-CEO executives. *Number of cohorts* is the number of age cohorts among non-CEO executives. *Board size* is the natural logarithm of the number of board directors. *Independent Directors* is the percentage of independent directors. *Duality* is a dummy variable which equals one if the CEO is also the chairman and zero otherwise. *Female executives* is the percentage of female executives. *CEO Age* is the natural logarithm of CEO age. *Executives age* is the average age of non-CEO executives. *State* is the proportions of shares owned by state-owned enterprises/central/local governments. *Foreign* is the proportions of shares owned by foreign investors. *Private* is the proportions of shares owned by a private investor. *Firm size* is the natural logarithm of total assets. *Leverage* is defined as the ratio of debt to total assets. *Firm age* is the natural logarithm of the number of years since initial public offering. All the independent variables are one year lagged. 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 14 Age diversity, pay gap and firm performance: Alternative pay gap measures

	Log (Pay gap ₁)			Log (Pay gap ₂)		
	ROA	ROE	EPS	ROA	ROE	EPS
	(1)	(2)	(3)	(4)	(5)	(6)
Log (Pay gap ₁)	0.003*** (0.001)	0.007*** (0.003)	0.028*** (0.009)			
Log (Pay gap ₂)				0.061*** (0.017)	0.144*** (0.043)	0.531*** (0.179)
Number of cohorts	0.004** (0.002)	0.008 (0.005)	0.032* (0.018)	0.167*** (0.056)	0.364** (0.146)	1.252** (0.615)
Log (Pay gap ₁)* Number of cohorts	-0.001** (0.000)	-0.002** (0.001)	-0.009** (0.004)			
Log (Pay gap ₂)* Number of cohorts				-0.021*** (0.007)	-0.045** (0.018)	-0.154** (0.076)
Executives age	-0.006 (0.012)	-0.032 (0.032)	-0.030 (0.097)	-0.009 (0.012)	-0.043 (0.030)	-0.073 (0.091)
Duality	-0.002 (0.002)	-0.007 (0.005)	-0.013 (0.017)	-0.001 (0.002)	-0.005 (0.005)	-0.002 (0.016)
Independent directors	0.004 (0.016)	0.022 (0.041)	0.087 (0.126)	-0.002 (0.015)	0.005 (0.038)	-0.020 (0.132)
State	0.016*** (0.004)	0.045*** (0.010)	0.103*** (0.036)	0.015*** (0.003)	0.044*** (0.009)	0.088*** (0.034)
Foreign	0.006 (0.010)	0.012 (0.024)	-0.004 (0.080)	0.002 (0.009)	0.005 (0.023)	-0.009 (0.078)
Female executives	-0.001 (0.006)	-0.005 (0.014)	0.012 (0.043)	-0.000 (0.005)	-0.005 (0.013)	-0.009 (0.042)
Board size	-0.007 (0.006)	-0.017 (0.015)	-0.045 (0.049)	-0.009 (0.005)	-0.025* (0.015)	-0.082 (0.051)
CEO age	-0.000 (0.006)	0.011 (0.015)	-0.050 (0.046)	0.001 (0.005)	0.015 (0.014)	-0.046 (0.043)
Leverage	0.024*** (0.006)	0.079*** (0.017)	0.070 (0.051)	0.023*** (0.006)	0.074*** (0.016)	0.059 (0.048)
Firm age	-0.002** (0.001)	-0.002 (0.002)	-0.066*** (0.007)	-0.002** (0.001)	-0.002 (0.002)	-0.062*** (0.007)
Firm size	-0.012*** (0.002)	-0.025*** (0.005)	-0.020 (0.015)	-0.012*** (0.002)	-0.027*** (0.005)	-0.024 (0.015)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	13,750	13,750	13,750	15,448	15,448	15,448
R2	0.061	0.047	0.051	0.061	0.047	0.051

The table presents the fixed effect regressions of firm performance on pay gap and the interaction between pay gap and age diversity, with alternative pay gap measures. The dependent variables firm performance are measured by *ROA*, *ROE* and *EPS*. In columns (1) to (3), Log (Pay gap₁) is the log difference between CEO pay and the mean value of non-CEO executive pay. In columns (4) to (6), Log (Pay gap₂) is the pay difference between the highest and the second highest executives. *Number of cohorts* is the number of age cohorts among non-CEO executives. *Board size* is the natural logarithm of the number of board directors. *Independent directors* is the percentage of independent directors. *Duality* is a dummy variable which equals one if the CEO is also the chairman and zero otherwise. *Female executives* is the percentage of female executives. *CEO age* is the natural logarithm of CEO age. *Executives age* is the average age of non-CEO executives. *State* is the proportions of shares owned by state-owned enterprises/central/local governments. *Foreign* is the proportions of shares owned by a foreign investor. *Private* is the proportions of shares owned by a private investor. *Firm size* is the natural logarithm of total assets. *Leverage* is the ratio of debt to total assets. *Firm age* is the natural logarithm of the number of years since initial public offering. 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 A Variables definition

Variable	Definition
<i>Panel A: Firm performance</i>	
ROA	Net income/ total assets
ROE	Net income/ book value of total equity
EPS	(Net income - dividends on preferred stock)/average outstanding shares
<i>Panel B: Tournament incentives (000s CNY)</i>	
Pay gap	Compensation of CEO - median value of compensation of non-CEO executives
Pay Gap ₁	Compensation of highest paid executive - compensation of second highest paid executive
Pay Gap ₂	Compensation of CEO - mean value of compensation of non-CEO executives
<i>Panel C: Age difference in non-CEO executives</i>	
Number of Cohorts	Number of age cohorts among non-CEO executives
2 Cohorts	Dummy variable equals one if non-CEO executives are from any two different cohorts (generations) and zero otherwise
3+ Cohorts	Dummy variable equals one if non-CEO executives are from any three or more different age cohorts (generations) and zero otherwise
Age dissimilarity (>20)	Dummy variable equals one if the age spread in non-CEO executives is larger than 20 years and zero otherwise
CV	Standard deviation of non-CEO executives' age / mean age of non-CEO executives' age
<i>Panel D: Other characteristics</i>	
State	Percentage of shares held by the government or state-owned enterprise
Foreign	Percentage of shares held by foreign investors
Independent directors	Percentage of independent directors
Duality	Dummy variable equals one if the CEO is also the chairman of the board and zero otherwise
Executive Age	The natural logarithm of average age of non-CEO executives
CEO Age	The natural logarithm of CEO age
Female executives	Percentage of female executives
Board size	The natural logarithm of board size
Leverage	Total debt/total assets
Firm size	The natural logarithm of total assets
List Age	The natural logarithm of the number of years since the firm has been listed



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