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## Executive Compensation and the Three-Dimensional Reference Framework: Insights from Data Analysis of Chinese Publicly Traded Firms



**Abstract:** - This paper examines the impact of different reference points on executive compensation of Chinese listed companies by applying three dimensional reference point theory. Drawing on a panel data of 1,236 non-financial Chinese listed companies over the period of 2008 to 2012, it provides evidence that the three dimensions which are composed of external, internal, and time are all positively and significantly related to the average cash compensation of the top three highest paid executives in China. The research also finds a significantly positive relationship between the joint effect of these dimensions measured by factor and the top three executive pay level. The result suggests that the Chinese listed companies usually refer to the pay level of their peer groups, other executives within firms, and previous period to design the compensation packages for their top executives. It finds that all three dimensions comprising external, internal and time are significantly and positively related to the average cash compensation of the top three highest paid executives. The paper further examines the relationship between the three dimensional reference points and executive compensation, and reveals other determinants other than performance, thus contributing to the discussion on the determinants of executive compensation in the corporate governance literature and important policy implication for Chinese authorities.

**Keywords:** Three-Dimensional Reference Point; Executive Pay; Corporate Governance; Compensation Structure

### I. INTRODUCTION

Interests in researching executive pay in the boarder context of corporate governance continue unabated (Chen, Ezzamel, and Cai 2011; Lee, Lev, and Yeo 2008). Despite appeals to experiment with new theories (Barkema and Gomez-Mejia 1998), the underlying model for most empirical studies on managerial incentives in advanced capitalist economics is the agency theory (Datta, Musteen, and Herrmann 2009). Drawing on the Anglo-American institution arrangements, the theory proposes an optimal contracting model that links performance with executive pay by depicting compensation as a reward for prior performance, or as a means of ex ante mechanism of aligning the interests of executives with those of shareholders (Dever, Cannella, Reilly, and Yoder 2007). While greater pay-performance sensitivity indicates greater alignment of executive and shareholder interests, but the empirical results are somewhat equivocal. Whereas Peni (2014), Cao, Lemmon, Pan, Qian, and Tian (2019) provide evidence supporting that performance is positively correlated with executive incentives and/or greater pay-performance sensitivity, others report low or opposite effect (Hambrick, Finkelstein, and Mooney 2005; Tosi, Werner, Katz, and Gomez-Mejia 2000). Furthermore, such an inconsistent practice magnifies itself in the worldwide financial crisis since 2008 in which top executives received escalated compensation in contrast to the plunging company stock price and spreading employ layoff.

Instead of examining the impact of performance on pay (Dever, Cannella, Reilly, and Yoder 2007), scholars have investigated executive pay structure from other perspectives. Among them, the perspective on the effect of behavioural influences of executives built upon the behaviour economics which considers the impacts of social, cognitive and emotional factors on economic decisions of individuals (or the bounds of rationality of economic agents) has become more pronounced in the literature (Certo, Daily, Cannella, and Dalton 2003; Kahneman and Tversk 1979; Tosi et al. 2000). Empirical studies provide supporting evidence of incentive pay is affected by executive behaviours and attitudes, such as executive power (Canyon 2006; Grinstein and Hribar 2004), rank (Barron and Waddell 2003), wealth (Becker 2006), and star power (Wade, Porac, Pollock, and Graffin 2006).

Through continuous reforms and developments, China's developing economy becomes one of the most central in the world. Firms are transitioning from previous state-owned enterprises (or SOEs) to listed on the Shanghai and

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Shenzhen Stock Exchange respectively. One distinct feature coupled with separating the state domination from firm's ownership and business operations is the reform of executive compensation. The listed companies in China have established profit retention or profit sharing schemes by linking executive salaries and bonus to firm performance with the aim to improve managerial incentives (Liu and Wan 2013). In contrast to the Western economies, Chinese market has its distinctive features in terms of weak shareholder protection and lack of a market for corporate control. Chinese listed firms are characterised by a concentrated state ownership structure, insider control (although the state does not hold 100 percent of the firms anymore), and large opportunistic benefits for company insiders (Conyon and He 2011). Given the different institutional settings, Conyon and He (2011) state that the determinants of executive pay have differential impacts between China and US. Lin et al., (2011) argue that the optimal contracting model seems to be less adaptable in China, since the model itself does not have sufficient references to different institutional environment across nations. Bruce, Buck, and Main (2005) state that agency theory which draws particular assumption on the specificity of US institutional arrangements has led to an overly narrow focus that is unhelpful when considering cross-country differences.

Several studies apply the intuitions of behaviour economics which seems less restrictive to institutional requirements (with no need to reply on the US or Western financial market) to examine executive compensation in Chinese listed companies. For instance, Lin et al. (2011) study the effect of remuneration committee in use of benchmark on designing executive pay structure. Their results show that existence of a remuneration committee on the board and its joint effect with the Foreign Direct Investment (FDI) which is considered as a benchmark are positively correlated with executive cash compensation. However, we question the explanatory power of FDI as a measure for benchmarking, since it is biased not only by variations in foreign investments due to changes in foreign policies of China but also by neglecting the effect of Chinese domestic investments (Sun and Tong 2003). Lin et al. (2011) applies tournament theory to explain the design of executive compensation in China. However, their results show that tournament prize (pay dispersion between CEO and other executives) is not related to the number of contestants in the tournament and is negatively related to the interaction term between number of contestants and government ownership. While these studies aim to investigate how behavioural attitudes of executives influence the pay structure, but the results are inclusive. Our study adds to this literature through applying reference point theory to reflect the impacts of different reference points on the Chinese top executive pay.

From the perspective of reference point theory, it is generally argued that when designing the contract for top executives, companies tend to anchor the level of compensation into certain reference intervals. In addition to internal working hours and compensation practices as influential factors in the study of executive compensation (Lazear 2018), we also investigate another two dimensions of reference point as complements. In specific, based on the fundamentals of strategic reference point matrix proposed Feigenbaum, Hart and Schendel (1996), we design a three dimensional reference point theoretical model that is composed of (1) the level of peer group compensation as an external dimension of reference point, (2) the level of compensation of other executives inside firm as an internal dimension of reference point, and (3) level of compensation received by the top executives in the previous period as a time dimension of reference point. Our study is mainly different from prior literature by building up a three dimensional reference point model and investigating the influence of each dimension on executive compensation in China.

Drawing on a panel data of 1,236 non-financial Chinese listed companies over the period of 2008 to 2012, we provide evidence that the three dimensions which are composed of external, internal, and time are all positively and significantly related to the average cash compensation of the top three highest paid executives in China. We also find a significantly positive relationship between the joint effect of these dimensions measured by FACTOR and the top three executive pay level. Our results suggest that the Chinese listed companies usually refer to the pay level of their peer groups, other executives within firms, and previous period to design the compensation packages for their top executives. Our study contributes to the literature of behaviour economics by shedding more light on the determinants in designing executive pay structure other than performance. To the best of our knowledge, there is no study that explicitly examines executive pay in China from the perspective of three dimensional reference point. Furthermore, our study is different from the prior research on executive compensation, which is largely based on the Western economies (Kimbrow and Xu 2016; Dever et al. 2007), as it focuses on China where the institutional settings are largely different from the Western experiences.

The remainder of this study is organised as follows. Section 2 reviews the literature on reference point theory and presents hypotheses development, followed by research design in Section 3. Empirical results are demonstrated in

Section 4, followed by Section 5 that concludes the study. need to create these components, incorporating the applicable criteria that follow.

## II. LITERATURE REVIEW

### A. Reference Point Theory

According to the optimal contracting model proposed by agency theory, pay arrangement designed based on company performance could be regarded as a partial remedy to the agency problem by aligning executive interests with those of shareholders (Kimbrow and Xu 2016). However, the dispersion between performance and pay that magnifies itself during the recent financial crisis since top executives walked away with generous pay packages raises concerns on the influential power of other factors that could determine the structure of executive pay package. In a review paper, Dever et al. (2007) stated that other determinant influences such as managerial time concern, different pay structure across firm and industry, human capital, and so forth may be relevant to developing a deeper understanding of executive compensation, but are fairly silent in the extant literature.

A prominent alternative theory that can be applied to describe and explain the determinants of executive compensation is the reference point theory, which was originated from the prospect theory of behaviour economics (Feigenbaum, Hart and Schendel 1996; Kahneman and Tversky 1979). It is mainly argued that individuals use targets or reference points in evaluating choices and that behaviour depends upon whether they perceive themselves as above (better than) or below (worse than) a specific reference point used (Kahneman and Tversky 1979). By applying initiations of reference point theory to the design of pay structure for top executives, it can be stated that the boards of directors may usually anchor the level of compensation into certain reference intervals. In specific, differences/changes in the executive compensation level mainly attribute to the adjustment results of referring to certain reference points.

Moreover, since the contract reflects a transaction between firms and their executives, more precisely, the executives' feelings of entitlement, underpaid compensation relative to the reference points are perceived to be distinctive for managers who are likely to reduce their effort at work. To sum up, executive compensation is targeted at, or above, certain reference points employed (Lazear 2018).

### B. Chinese Institutional Settings

The evolution of executive compensation in China has been largely enforced by the market-oriented reforms that have taken place since 1978. Prior to 1978, all Chinese enterprises which are performed under the centrally planned economy are state owned and their profits are repatriated to the state. Particularly for start-up listed companies, the market-based economic reforms also urge corporate governance reforms. As the origin of Corporate Governance Reform in China, the Chinese Company Law came into force in 1994. The responsibilities, rights and liabilities of the shareholders, the board of directors, managers and supervisors are clearly identified in the Company Law. The implementation of the Code of Corporate Governance for Listed Companies in China in 2002 played a decisive role in the development of Chinese Corporate Governance Reform. The Chinese corporate governance system and executive incentives have evolved based on the regulations and practices of Western economies. Firth, Fund and Rui (2006) argue that it is precise because Corporate Governance Reform in China is a type of corporate governance reform based on Western economies that we can apply Western research to some extent to explain CEO compensation. As for executive compensation, the Code aims to guide the independent directors and remuneration committee on how to establish the compensation structures for executives.

## III. HYPOTHESIS DEVELOPMENTS

### A. *External Dimension of Reference Point*

In the process of designing and analysing pay structure, firms, especially their compensation committees, often use information on pay practices at comparison or peer executives/groups, which are usually similar-size firms from the same industry (Bizjak et al. 2008). In addition, in the US, the main reason compensation increases every year is that boards want their top executives to be in the top half of the executive peer group, because they think it makes the company look strong. Considering peer groups as a dimension of reference point which is external to firms, researchers typically assume that the determinants of pay level is attributed to the individually perceived economic value (e.g., managerial skills, professional knowledge, and other types of human capital) in comparison with those of their peers (Wade, O' Reilly, and Pollock 2006). Given the level of economic value perceived, the executives who believe are paid less than their peers are usually characterised by perceptions of inequity, jealousy, and

decreased satisfaction (Pfeffer and Langton 1993), all of which threaten individual effort at work (Henderson and Fredrickson 2001).

Based on 63 US companies for the year 1982-86, Kerr and Kren (1992) study the extent to which boards use relative decision monitoring to evaluate and compensate corporate chief executives. They find that relative evaluation of executive compensation amplifies the information gathered (or lowers the level of information asymmetry in designing executive pay) by comparing compensation level with that of the reference group. This incremental information should improve the efficiency of compensation schemes. Based on a sample of 15,329 firm-year observations over the period of 1992-2005, Bizjak et al. (2008) provide empirical evidence on how the practice of competitive benchmarking affects chief executive officer (CEO) pay in the US. More generally, they find that the use of benchmarking is widespread and has a significant impact on CEO compensation. In most firms, salary and, either directly or indirectly, target bonuses and option pay are anchored to the peer group. Furthermore, in an analysis of the corporate governance developments in the US during 1982 and 2001, Holmstrom and Kaplan (2003) refer peer group observation as a process of benchmarking and argue that benchmarking represents an efficient way to set pay level in a fair and efficient manner.

In China, the corporate governance Code 2002 encourages listed companies to establish remuneration committee that is mainly in charge of setting up the pay structure of executives. For its composition, remuneration committee shall be chaired by an independent director, and independent directors shall constitute the majority of the committee. Although the Code states that remuneration committee shall periodically evaluate the performance of executives through a combination of self-review and peer review (CSRC, 2002a), detailed operational measurements regarding executive pay do not exist in the Code (Lin et al., 2011). Regarding the disclosure requirements of the information on executive compensation, the CSRC requires all publicly traded firms to report the sum of total compensation for the three highest-paid management and the three highest paid board members (including executive board members) starting from 2001 (CSRC, 2000; 2002b). And from 2006 onward, all listed companies also have to report the compensation details of each individual board member and top manager, such as salary, bonus, stipends, and other benefits (CSRC, 2005; 2007).

Given the market-based economic reforms and the implementations of several corporate governance requirements which increase the availability of the information disclosed about executive compensation, it is argued that the Chinese firms and/or the remuneration committees may refer peer groups as an external reference dimension point to set up pay level of their top executives. Accordingly, we formulate our first reference point effect hypothesis on the positive relationship between top executive compensation and that of peer groups as follows:

H1: The level of top executive compensation is positively related to the compensation of peer executives external to firms.

However, neither the remuneration committee nor the labour market in China can be considered as effective as they performed in the Western countries. While the remuneration committee is lack of specific operational measurements, the labour market is under-developed due to the weak regulatory infrastructure and limited market for corporate control (Canyon and He 2011; Sun and Tong 2003). Given the “free-rider” problem, it makes the process of obtaining accurate executive compensation (peer groups) difficult and/or costly for some companies. In such a circumstance, the Chinese firms may refer to other dimensions of reference point theory which can be easily constructed with low cost as complements to peer group dimension. In line with the strategic reference point matrix of Feigenbaum et al. (1996), we propose two additional dimensions that could be used in executive compensation design in Chinese listed companies, namely the level of compensation of other executives internal to firms (internal dimension of reference point), and the level of compensation received by the top executives in the previous period (time dimension of reference point).

#### *B. Internal Dimension of Reference Point*

More generally, it is argued that variables internal to the firms are crucial to success and constitute important reference dimensions for organisational members (Prahalad and Hamel 1990; Ulrich and Lake 1991). In this spirit, as an important internal variable, company usually refers the level of compensation received by other executives within the firm to set up and/or make adjustment of the pay structure of a specific chief executive. As stated Lin et al. (2011) and Canyon, Peck, and Sadler (2001), executives perceive compensation as a reward for their effort where what matters is not the absolute level of performance, but how much received in relation to other executives. This school of literature suggests that referring pay package to that of other executives within firms can increase

individual motivation, since such an individual may spend effort to increase the likelihood of ‘matching’ and/or ‘catching up’ the level of other executive payment (Devers et al. 2007; Henderson and Fredrickson 2001). Based on executives of 199 S&P’ s 500 firms over the period of 1993-95, Carpenter and Sanders (2002) examine the interplay between top management team pay (TMT is defined as a group composed of the president and the heads of departments) and CEO pay. They find that both level of total TMT pay and the ratio of long-term to total TMT pay are positively related (albeit imperfectly) to that of CEOs. Furthermore, they re-define TMT group by including CEO compensation and document a positive correlation between this new TMT group and other executives at the next level below. In a study of 224 US multinational corporations, Carpenter and Sanders (2004) provide consistent results and further find the degree of firm internationalisation (complexity) positively moderated all relationships. Graffin, Wade, Porac and McNamee (2008) explore TMT pay in firms with a celebrity CEO drawing on 264 S&P’ s 500 firms during 1992 and 1996. Results show that the compensation increases bestowed on celebrity CEOs are also captures by the other top managers of firms.

In line with the literature, we propose that top executive pay packages in Chinese listed companies may also be settled by referring to pay level of other executives inside firms. Thus, our second reference point effect hypothesis on the positive relationship between the level of top executive compensation and other executive pay inside the firm is formulated as follows:

H2: The level of top executive compensation is positively related to the compensation of other executives internal to firms.

#### C. *Time Dimension of Reference Point*

Time is considered as the third dimension in our three dimensional reference point model. From the perspective of time reference point, it can be arguably stated that people always wish for a pay raise in the next financial period. In particular, they tend to be happier and more motivated if they get a better pay than before which leads them unconsciously set up their previous pay level as the reference point for their pay in the current period in the time dimension (Callaghan, Saly, and Subramaiam 2004; Dever et al. 2007; Lie 2005). Based on the sample of 255 large UK firms over the period of 1992 to 1995, Ezzamel and Watson (1998) find that executives are paid at least at the going rate and that deviations from that rate will influence subsequent pay level. Furthermore, the recent literature emphasises that executive compensation in the previous period could be regarded as the benchmark of not only reflecting executives performance but also of realising their feelings of entitlement. Deviation from such a benchmark can decrease productivity and collaboration (Shaw, Gupta and Delery 2002) and lead to shorter tenures (Firth et al. 2006b; Ryan and Wiggins 2004), higher turnover (Bushman, Dai, and Wang 2010), and, at times, lower performance (Frydman and Saks 2010). Given the evolution of executive compensation in China, Chinese executives are not exceptions to consider time reference. Accordingly, we formulate our third reference point effect hypothesis on the positive relationship between top executive pay and previous amount received as follows:

H3: The level of top executive compensation is positively related to compensation received in the previous period.

## IV. RESEARCH DESIGN AND METHODOLOGY

### A. *Data and Sample*

In order to test our hypotheses, we use a sample of publicly traded Chinese companies listed on the domestic exchanges from the 2008 to 2012 for better quantity of the data. In particular, our data are obtained from two separate data sets. First, the executive compensation and corporate governance data are obtained from the China Centre for Economic Research (CCER) database. Second, the financial performance and accounting data are obtained from the China Stock Market and Accounting Research (CSMAR). The data sets have been used in previous research, such as Lin et al. (2011), and Conyon and He (2011). It is important to comment on the quality of the executive compensation and corporate governance data. Both CCER and CSMAR data are collected directly from public firms’ annual financial reports as published in Securities Times, Shanghai Securities Daily, China Securities Daily, and other major newspapers designated by the CSRC. Double-checking has been performed to ensure coding accuracy and the integrity of the data.

We construct a balanced sample, which allows for consecutive analysis of executive compensation and the corresponding determinants on such a phenomena from perspectives of different reference points. Accordingly, we exclude (1) firms that have non-consecutive stock trading record over the study period, such as firms are labelled as Particular Transfer, and/or Delisting firms; (2) firms that have extreme large loss records which do not have representative meaning to the sample set; (3) firms that are listed during the observation period but have no data available required by our study (Lin et al. 2011). The sample has also been restricted to non-financial companies as the specific accounting requirements of financial institutions vary significantly from those of industrial and commercial firms. Additionally, financial firms are under increased regulation, which may systematically affect their executive remuneration (Firth et al., 2006a; 2006b).

Under the above criteria, we have a final balanced panel sample set composed of 1,236 listed companies per year, with 6,180 firm-year observations representing the period 2008 to 2012. Furthermore, we have covered all 31 provincial regions in mainland China within our sample set, along with 12 out of the total 13 industries (except for finance and insurance companies, i.e. Group 1). The sufficient industry and geographical coverage not only improves the representative nature of the data but also controls for hidden biases caused by the non-observable firm and time effects in the regression.

## B. Variables Selection and Measurement

### a. Dependant Variable

As argued by the prior literature (Lin et al. 2011; Firth et al. 2006a) that Chinese listed companies disclose only cash remuneration without breaking it into salary, bonus and allowances, we use the cash compensation of firm's top three highest paid executives. We do not include stock option and stock ownership, since they are rarely used in China comparing with those used in US and UK. Lin et al. (2011) state that due to the limited level of detail disclosure on stock option in China, the data is not sufficient to value option grants. Thus, our dependent variable is measured by the natural logarithm value of firm  $i$ 's average cash compensation of the three highest paid executives in year  $t$ , hereby denoted as  $\text{LnCompi,t}$ . The logarithmic procedure alleviates the heteroscedasticity caused by extreme skewness and facilitates comparison with previous studies. (Faulkender and Yang 2010; Firth, Fung, and Rui 2007)."

### b. Independent Variables

We introduce two sets of additional variables to control the effects of firm's corporate governance (e.g., CEO features, board of directors, supervisory board, ownership structure and foreign investment) and specific operational characteristics (return on assets, firm size, leverage and growth opportunity) respectively. In order to control the effect of CEO dominance over compensation (Lin et al. 2011), we proxy CEO features using a dummy variable ( $\text{DUALITY}_{i,t}$ ) and a continuous variable ( $\text{CEOSHARE}_{i,t}$ ) accordingly:  $\text{DUALITY}_{i,t}$  takes the value of 1 if the CEO in firm  $i$  simultaneously serves the Chair in year  $t$ , and 0 otherwise;  $\text{CEOSHARE}_{i,t}$  represents the percentage shareholdings held by CEO in firm  $i$ , and year  $t$ . It is argued that since independent directors do not engage in day-to-day business operations, they could independently perform judgment and review of the firms (Link, Netter, and Yang 2008). With regard to executive compensation, we argue that the greater the proportion of independent non-executive on the board, the more vigilant evaluation of the level of executive pay could be done by the board (Lin et al. 2011). We proxy board independence by introducing the variable named  $\text{INDBOARD}_{i,t}$  that is measured by the percentage of independent directors on the board in firm  $i$ , and year  $t$ . For controlling the effect of a supervisory board which represents employees' interests, we introduce variable of  $\text{SUPERBOARD}_{i,t}$  that is measured by the total number of firm  $i$ 's members on the supervisory board in year  $t$ . With regard to ownership structure, we control the effects of both ownership type ( $\text{STATE}_{i,t}$ ) and concentration ( $\text{TOP5}_{i,t}$ ). In particular, while  $\text{STATE}_{i,t}$  is a dummy variable takes the value of 1 if firm  $i$  is a state-controlled firm in year  $t$ , and  $\text{TOP5}_{i,t}$  measured by the Herfindahl index (the sum of squared fraction of shareholding by each of the top five investors) in firm  $i$ , and year  $t$ , to capture the potential effect of ownership concentration by the first to fifth largest shareholders. We further introduce the dummy variable of foreign investment ( $\text{FOREIGN}_{i,t}$ ), which takes the value of 1, if foreign investor is the controlling shareholder of firm  $i$  in year  $t$  or if a firm has issued B and/or H shares, 0 otherwise. This is consistent with the evidence found by Lin et al. (2011) in Chinese listed firms that the Chinese compensation committees target the global pay levels for setting the executive compensation and thus tend to award generous pay packages to their executives, especially in foreign invested firms.

Furthermore, we introduce four specific control variables to reflect the impacts of firm’s operational characteristics. They are composed of return on assets (ROA<sub>i,t</sub>) measured by the ratio of firm i’s earnings before extraordinary items and discontinued operations in year t to total asset in year t-1, firm size (SIZE<sub>i,t</sub>) measured by the natural logarithm value of firm i’s total asset of year t-1, leverage (LEVERAGE<sub>i,t</sub>) measured by the ratio of total liability of firm i in year t to total asset in year t-1, and growth opportunity (GROWTH<sub>i,t</sub>) that is proxied as the market value of firm i’s total asset in year t to its book value in year t-1.

Table 1. Definitions of Variables.

Dependent Variable	Descriptions
<i>LnComp<sub>i,t</sub></i>	=the natural logarithm value of firm i’s average cash compensation of three highest paid executives in year t.
Independent Variables	Descriptions
<i>EXTERNAL<sub>i,t-1</sub></i>	=the natural logarithm value of peer three highest paid executives’ average compensation in firm i, year t-1. Peer top executives are clustered by industry, area, and firm size.
<i>INTERNAL<sub>i,t</sub></i>	=the natural logarithm value of the arithmetic average pay level of other executives (besides the three highest paid executives) on the board in firm i, and year t.
<i>TIME<sub>i,t-1</sub></i>	=the natural logarithm value of firm i’s average cash compensation of three highest paid top executives in the year t-1.
Control Variables	Descriptions
<i>DUALITY<sub>i,t</sub></i>	=1 if the CEO simultaneously serves as the Chairman in firm i, year t, and 0 otherwise.
<i>CEOSHARE<sub>i,t</sub></i>	=percentage of share held by the CEO in firm i in year t.
<i>INDBOARD<sub>i,t</sub></i>	=IND <sub>i,t</sub> /TOTAL <sub>i,t</sub> , where IND is the number of independent directors on the board and TOTAL is the total number of directors on the board in firm i, year t.
<i>SUPERBOARD<sub>i,t</sub></i>	=the total number of directors on the supervisory board of firm i in year t.
<i>STATE<sub>i,t</sub></i>	=1 if firm i is a state-controlled company in year t, and 0 otherwise.
<i>TOP5<sub>i,t</sub></i>	= $\frac{S_n^2}{S^2}$ or (Herfindahl index), where S <sub>n</sub> is the number of shares held by the nth largest stockholder, and S is the number of total outstanding shares.
<i>ROA<sub>i,t</sub></i>	=EBXI <sub>i,t</sub> /ASSET <sub>i,t-1</sub> , where EBXI <sub>i,t</sub> is the earnings before extraordinary items and discontinued operations in firm i, year t, ASSET <sub>i,t-1</sub> is firm i’s total asset in year t-1.
<i>SIZE<sub>i,t</sub></i>	=LnASSET <sub>i,t-1</sub> , where LnASSET <sub>i,t-1</sub> is the natural logarithm of firm i’s total assets in year t-1.
<i>LEVERAGE<sub>i,t</sub></i>	=(LTD <sub>i,t</sub> +STD <sub>i,t</sub> )/ASSETS <sub>i,t</sub> , for firm i in year t, where LTD is the long-term debts and STD is the short-term debts. ASSETS is the total assets in year t-1.
<i>GROWTH<sub>i,t</sub></i>	=MK <sub>i,t</sub> /BV <sub>i,t-1</sub> , where MK <sub>i,t</sub> the market value of firm i’s total asset in year t, and BV is the book value of firm i’s total asset in year t-1.
<i>FOREIGN<sub>i,t</sub></i>	Equal to 1 if foreign investor is the controlling shareholder of a firm or if a firm issues B share and/or H share

c. Model Specification

We develop the following regression model to test the hypotheses formulated:

$$LnComp_{i,t} = \beta_0 + \beta_1 EXTERNAL_{i,t} + \beta_2 INTERNAL_{i,t-1} + \beta_3 TIME_{i,t-1} + \beta_4 DUALITY_{i,t} + \beta_5 CEOSHARE_{i,t} + \beta_6 INDBOARD_{i,t} + \beta_7 SUPERBOARD_{i,t} + \beta_8 STATE_{i,t} + \beta_9 TOP5_{i,t} + \beta_{10} ROA_{i,t} + \beta_{11} SIZE_{i,t} + \beta_{12} LEVERAGE_{i,t} + \beta_{13} GROWTH_{i,t} + \beta_{14} FOREIGN_{i,t} + \varepsilon_{i,t}$$

where i and t present firm and time vector respectively.

The expression above represents the model specification for testing the hypotheses controlling for the effects of firm’s corporate governance and operating characteristics. In particular, we aim to explore the effects of three dimensional reference points on the level of executive pay. In view of the nature of panel data analysis, industry

and area dummy variables are not included in the model, for most of them are invariant with time and will be dropped from the estimation automatically. The estimated coefficient of  $\beta_1$ ,  $\beta_2$ , and  $\beta_3$  represents the impact of external, internal and time reference dimension on top executive pay structure in China. If our hypotheses stand, that is, the top executives are paid benchmarking the external, internal and time reference points; the coefficients are expected to be positive at a statistically significant level.

To test the applicability of our model, we conducted the following tests. First, our model rejects the null hypothesis of the Durbin-Wu-Hausman test at a 0.001 significance level. Therefore, we used OLS controlled for fixed effects in our main model. Second, considering the problem of multicollinearity, we separately calculated the variance inflation factor (or VIF) for each variable in the regression model. With all the VIFs below 2 (not reported here), we conclude that multicollinearity should not be a major issue in our regressions. Finally, an underlying problem that arises from the use of panel data is that the OLS White standard errors may be skewed once the residuals are correlated across firms or across time, so that the t-statistic may be overestimated (Lin et al., 2011). Petersen (2009) suggests that standard errors grouped by the firm are non-biased and generate the confidence interval for the correct size, regardless of whether residual dependence is permanent or temporary for the same firm in different years. Thus, by following the procedure of Petersen (2009), the presented standard errors in our regressions are calculated using the observations as grouped by the firm.

## V. EMPIRICAL RESULTS

### A. Descriptive Statistics

Panel A of Table 2 demonstrates summary statistics of the variables introduced in our analysis models, including their mean (MEAN), median (MEDIAN), minimum (MIN.), maximum (MAX.), and standard deviation (STD.). Regarding the pay level of top three executives (or  $\text{LnComp}_{i,t}$ ), it has mean of 12.31 and median of 12.39 with standard deviation of 0.88.

Table 2. Descriptive Statistics.

*Panel A. Descriptive statistics on all variables.*

VARIABLES	OBS.	MEDIAN	MEAN	MIN.	MAX.	STD.
$\text{LnComp}_{i,t}$	6,180	12.39	12.31	2.27	16.48	0.88
$\text{EXTERNAL}_{i,t-1}$	6,180	12.46	12.43	2.30	16.50	0.89
$\text{INTERAL}_{i,t}$	6,180	10.82	10.48	1.06	15.99	1.41
$\text{TIME}_{i,t-1}$	6,180	12.20	12.16	2.02	16.48	0.89
$\text{DUALITY}_{i,t}$	6,180	0.00	0.13	0.00	1.00	0.33
$\text{CEOSHARE}_{i,t}$	6,180	0.0001	0.0045	0.0000	0.5270	0.03
$\text{INDBOARD}_{i,t}$	6,180	0.33	0.35	0.00	0.67	0.05
$\text{SUPERBOARD}_{i,t}$	6,180	3.00	4.10	0.00	13.00	1.42
$\text{STATE}_{i,t}$	6,180	1.00	0.68	0.00	1.00	0.47
$\text{TOP5}_{i,t}$	6,180	0.16	0.19	0.02	0.96	0.13
$\text{ROA}_{i,t}$	6,180	0.03	0.02	-3.77	2.30	0.15
$\text{SIZE}_{i,t}$	6,180	21.38	21.44	10.84	28.36	1.28
$\text{LEVERAGE}_{i,t}$	6,180	0.53	0.52	0.00	1.00	0.19
$\text{GROWTH}_{i,t}$	6,180	1.20	1.60	0.05	19.20	1.22
$\text{FOREIGN}_{i,t}$	6,180	0.00	0.04	0.00	1.00	0.18

*Panel B. Descriptive statistics on executive compensation variables.*

VARIABLES		2008	2009	2010	2011	2012
$\text{LnComp}_{i,t}$	Median	11.95	12.06	12.30	12.46	12.56
	Mean	11.92	12.02	12.28	12.44	12.52



	Std Dev.	0.82	0.88	0.84	0.81	0.82
<i>EXTERNAL<sub>i,t-1</sub></i>	Median	12.01	12.13	12.46	12.56	12.69
	Mean	12.02	12.13	12.45	12.57	12.69
	Std Dev.	0.42	0.41	0.41	0.42	0.42
<i>INTERNAL<sub>i,t</sub></i>	Median	9.90	10.00	10.26	10.47	11.34
	Mean	9.80	9.74	10.16	10.36	11.31
	Std Dev.	1.31	1.68	1.35	1.28	0.94
<i>TIME<sub>i,t-1</sub></i>	Median	11.82	11.95	12.06	12.30	12.46
	Mean	11.80	11.92	12.02	12.28	12.44
	Std Dev.	0.80	0.82	0.88	0.84	0.81

From the perspective of three dimensions, the pay level of peer groups has the highest value in mean (12.43) and median (12.46), followed by time dimension (mean is 12.16 and median is 12.20) and internal dimension of reference point (mean is 10.28 and median is 10.82). These results are all fairly closed to those of  $LnCompi,t$  indicating Chinese listed companies may consider the compensation level of peer groups outside companies, other internal executives, and previous pay level in the process of compensation design. Specifically, the small advance of peers pay to  $LnCompi,t$  may reflect the ‘catch-up’ or ‘benchmarking’ to industry peer level in top executive compensation contracting. And the relatively lower value on  $TIME_{i,t-1}$  and  $INTERNAL_{i,t}$  implies that top executive tends to get a higher pay than other executives on board and a pay raise over time is expected and commonly practiced.

With regards to the corporate governance variables reported in Panel A of Table 2, we find that while the number of CEOs simultaneously holding Chair position is few, their shareholding is rather low in China. The mean of  $DUALITY_{i,t}$  and  $CEOSHARE_{i,t}$  was 0.13 and 0.45% respectively. The low CEO shareholding indicates that offering CEO share options as a means of aligning the interests of managers with those of shareholders proposed by the optimal contracting model may not be considered as an effective mechanism in Chinese listed companies. For the board independence ( $INDBOARD_{i,t}$ ), on average, the proportion of independent directors served on the boards is 35% (the median was 33%). Such results reflect compliance of Chinese listed companies with the corporate governance code (CSRC, 2002), which requires the boards including at least one-third of the members being independent directors. We find that the supervisory board in China is composed of 4 board members on average. Regarding ownership type. Most of the Chinese listed companies are still controlled by the government, since the mean of variable  $STATE_{i,t}$  is about 0.68 by the end of 2012. For ownership concentration, the mean and median of  $TOP5_{i,t}$  is 0.19 and 0.16 respectively. The mean of  $FOREIGN_{i,t}$  is 0.04, which indicates a small proportion of foreign invested firms in Chinese listed firms. The summary statistics of operating control variables shows that although the Chinese listed companies have relatively low  $ROA_{i,t}$  (mean is 0.02), they are normally big in size (the mean of  $SIZE_{i,t}$  is 21.44), highly leveraged (the mean of  $LEVERAGE_{i,t}$  is 0.52), and growing (the mean of  $GROWTH_{i,t}$  is 1.60).

In Panel B of Table 1, we find the increasing trends in pay of the top three executives as well as in the three dimensions of reference point over the period of 2008 and 2012. While the mean of  $LnCompi,t$  increases to 12.65 (RMB223,904 or USD37,890) by the end of 2012 from 11.92 in 2008, its median grows 6.12% to 12.56 (RMB240,386 or USD37,780) over the study period. By the end of 2012, the annual average employee income (at overall level) is about RMB40,000 suggesting a ratio of executive to employee pay of 5.5. In addition, the mean and median of the three dimensions also increase steadily over time. Such as, by the end of 2012, the mean (median) of  $EXTERNAL_{i,t-1}$  increased to 12.69 (12.69), the mean (median) of  $INTERNAL_{i,t}$  grew to 11.31 (11.34), and the mean (median) of  $TIME_{i,t-1}$  raised to 12.44 (12.46). Figure 1 provides graphical illustration of the increasing trends in mean of the different compensation measures.

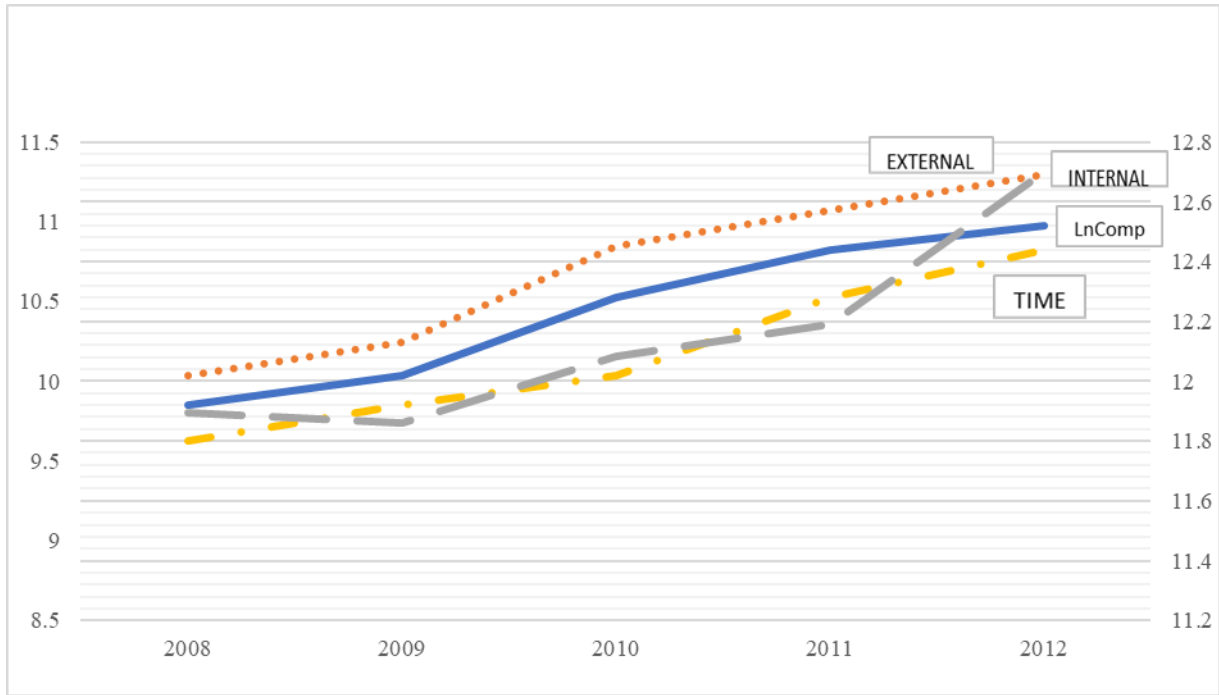


Figure 1. The Compensation Trends in Chinese listed companies.

Data: Compiled from the dataset

Table 3 reports Pearson correlation coefficients. As predicted, all three measures of reference point dimensions are positively correlated with the proxy for the level of top executive compensation. In addition, the dimension measures are positively and significantly correlated. However, as the correlation coefficients are below 1, they still capture somewhat different dimensions of reference point, and using different dimension proxies in our tests increases the generalisability of our inferences. As correlation results do not control for differences in firm and industry characteristics, we now turn to multivariate tests.

Table 3. Pearson Correlation Matrix.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. $LnComp_{i,t}$	1													
2. $EXTERNAL_{i,t}$	0.51 4**	1												
3. $INTERNAL_{i,t}$	0.67 0**	0.36 2**	1											
4. $TIME_{i,t-1}$	0.60 7**	0.37 2**	0.49 3**	1										
5. $DUALITY_{i,t}$	0.00 6	- 0.01 9	- 0.00 6	0.00 6	1									
6. $CEOSHARE_{i,t}$	0.06 9*	- 0.01 20	0.06 0*	0.03 8*	0.09 2*	1								
7. $INDBOARD_{i,t}$	0.10 7**	0.08 0*	0.11 9**	0.09 0*	0.03 5*	0.04 5*	1							
8. $SUPERBOARD_{i,t}$	- 0.00 7	0.05 3*	- 0.04 0*	- 0.02 7	- 0.08 2*	- 0.10 3**	- 0.10 3**	1						

9. $STATE_{i,t}$	0	0.047*	-0.018	0.017	-0.073*	-0.215**	-0.215**	-0.041*	1					
10. $TOP5_{i,t}$	-0.053*	0.039*	-0.051*	-0.035*	-0.067**	0.017	0.0170	-0.004	0.057*	1				
11. $ROA_{i,t}$	0.291**	0.158**	0.255**	0.155**	-0.026	0.0250	0.0110	-0.009	-0.027	0.105**	1			
12. $SIZE_{i,t}$	0.445**	0.543**	0.373**	0.281**	-0.061**	-0.120**	0.107**	0.179**	0.172**	0.088**	0.177**	1		
13. $LEVERAGE_{i,t}$	0.001	0.061*	0.016	0.016	-0.045*	-0.115**	0.036*	0.055*	-0.004	-0.099**	-0.319**	0.239**	1	
14. $GROWTH_{i,t}$	0.137**	-0.038*	0.107**	0.096**	0.0170	0.045*	0.048*	-0.045*	-0.095**	-0.161**	0.217**	-0.157**	-0.187**	1

\*, \*\* represent significance at the 5 percent and 1 percent levels, respectively, using two-tailed tests.

B. Main Results and Discussion

Table 4 shows the main regression results. The adjusted R2 for the regression models are 41% and 66% respectively, in line with prior studies on executive pay in China (Lin et al. 2011; Conyon and He 2011).

Table 4. Panel Data Estimation for Three Dimensional Reference Point.

<b>DEPENDENT VARIABLE</b>				
<b>Executive cash compensation <math>LnComp_{i,t}</math></b>				
	<b>MODEL 1</b>		<b>MODEL 2</b>	
<b>INDEPENDENT VARIABLES</b>	<b>COEF.</b>	<b>STD.</b>	<b>COEF.</b>	<b>STD.</b>
$EXTERNAL_{i,t-1}$			0.31***	0.03
$INTERAL_{i,t}$			0.32***	0.01
$TIME_{i,t-1}$			0.28***	0.01
$DUALITY_{i,t}$	0.01	0.03	0.01	0.03
$CEOSHARE_{i,t}$	1.94***	0.38	0.94***	0.29
$INDBOARD_{i,t}$	-0.36	0.25	-0.03	0.19
$SUPERBOARD_{i,t}$	-0.02*	0.01	-0.00	0.01
$STATE_{i,t}$	0.04	0.03	-0.00	0.02
$TOP5_{i,t}$	-0.49***	0.10	-0.24**	0.08
$ROA_{i,t}$	2.33***	0.18	1.19***	0.15
$SIZE_{i,t}$	0.34***	0.01	0.10***	0.01
$LEVERAGE_{i,t}$	-0.14*	0.07	-0.13*	0.06
$GROWTH_{i,t}$	0.06**	0.02	0.03**	0.01
$FOREIGN_{i,t}$	0.84**	0.30	0.72**	0.27

<i>Firm Fixed effects</i>	Yes	Yes
<i>Time dummies</i>	Yes	Yes
<i>Adjusted R<sup>2</sup></i>	0.41	0.66
<i>No. of observation</i>	6,180	6,180

\*,\*\*,\*\*\* denote significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

In Model 1 of Table 4, we regressed our control variables against average executive pay level. Notably, eight of the control variables influence executive pay to certain significant level (with significance level ranging from 10% to 0.1%). In particular, our results suggest that the top executives in China expect to receive higher cash compensation, if they hold larger amount of companies' shares, the companies they managed are normally larger and growing, and most importantly are making profits, since the magnitude of variable  $ROA_{i,t}$  has the highest value of 2.33 (at 1 per cent significant level) among other firms' operating characteristics control variables. Chinese executives also tend to be compensated at a higher level if the firm is heavily foreign invested. On the other hand, such an expectation of receiving higher pay is significantly restricted (at 10 per cent significant level and 1 per cent significant level respectively) by the controlling shareholders (the coefficient of  $TOP5_{i,t}$  is -0.49) followed by the creditors (the coefficient of  $LEVERAGE_{i,t}$  is -0.14) and the supervisory board (the coefficient of  $SUPERBOARD_{i,t}$  is -0.02) of the firms. In contrast to the results of Lin et al. (2011) on CEO duality, we find positive but insignificant relationship between variable  $DUALITY_{i,t}$  and  $LnCompi,t$ . One reason may be that only few CEOs are simultaneously holding the position of Chair in the Chinese listed companies, thus the effect of CEO duality is minimal.

Model 2 of Table 4 contains the main results of our three dimensions of reference point predictions with the executive pay level hypotheses, after controlling for firm, industry, and year effects. The results of the control variables are very similar with those reported in Model 1 suggesting the necessity of including these variables in exploring the phenomenon of executive pay in China, although the negative impact of the supervisory board turned to be insignificant at any given level. The external dimension reference point denoted as the  $EXTERNAL_{i,t-1}$  is positively (the coefficient is 0.31) and significantly (at 1 per cent significance level) associated with the executive pay level in the Chinese listed companies. Given that the mean of top executive compensation equals 12.31, such effect represent an increase of 2.3%. It is reflected that the Chinese listed companies are very likely to increase the pay level of their top executives referring to the standards of peer group companies. Overall, these results support our hypothesis 1 suggesting that the external dimension reference point influences the design of executive pay structure in China. Other than the external dimension reference point, we also document pronouncing impacts of both internal dimension and time dimension on top executive pay level. While the variable  $INTERNAL_{i,t}$  is positively (0.32) and significantly (at 1 per cent significant level) associated with  $LnCompi,t$ , time dimension also has a positive relationship (0.28) which is significant at 1 per cent level with the executive pay of the top three executives in companies. Given the mean of executive pay ( $LnCompi,t$ ), such effects illustrate an increase of 1.6% and 1.15% accordingly. The results imply that due to the characteristics of Chinese institutional settings (e.g., lack of effective remuneration committee, weak legal infrastructure), listed companies in China may refer to other dimensions of reference point theory with relatively low cost as complements to peer group dimension. In specific, they refer to the level of compensation of other executives within firms and level of compensation received in the previous period for constructing the executive pay level. Hence, hypothesis 2 and 3 are supported by our data.

Our main regression results show that the three dimensions individually influence the executive pay level in Chinese listed companies. We also investigate the joint effects of these dimensions on the pay level. We re-run the regression models by introducing the optimal principal component (or denoted as  $FACTOR$ ) to extract and proxy the systematic effects of the three dimensions, instead of testing them individually. The variable  $FACTOR$  is found using the Principal Component Analysis (PCA) on the observations of the three dimension variables. In general, the results reported in Table 5 are qualitatively similar to our main regressions' results. The coefficient of  $FACTOR$  is 0.58 and significant at 1 per cent level. State differently, for every unit systematic upward movement of the three dimensions pay reference point, the top executive pay would raise by 0.58 units.

Table 5. Panel Data Estimation for Three Dimensional Reference Point Using Principal Component Analysis (PCA).

<b>DEPENDENT VARIABLE: Executive cash compensation <math>LnComp_{i,t}</math></b>				
	<b>MODEL 1</b>		<b>MODEL 2</b>	
<b>INDEPENDENT VARIABLES</b>	<b>COEF.</b>	<b>STD.</b>	<b>COEF.</b>	<b>STD.</b>
<i>FACTOR</i>			0.58***	0.01
<i>DUALITY<sub>i,t</sub></i>	0.03	0.05	0.00	0.03
<i>CEOSHARE<sub>i,t</sub></i>	1.68**	0.44	1.10***	0.30
<i>INDBOARD<sub>i,t</sub></i>	-0.11	0.04	-0.05	0.20
<i>SUPERBOARD<sub>i,t</sub></i>	-0.01	0.01	-0.01	0.01
<i>STATE<sub>i,t</sub></i>	0.05*	0.33	-0.01	0.02
<i>TOP5<sub>i,t</sub></i>	-0.44***	0.20	-0.26**	0.08
<i>ROA<sub>i,t</sub></i>	2.15***	0.55	1.35***	0.15
<i>SIZE<sub>i,t</sub></i>	0.44***	0.12	0.07***	0.01
<i>LEVERAGE<sub>i,t</sub></i>	-0.10*	0.04	-0.11*	0.06
<i>GROWTH<sub>i,t</sub></i>	0.05*	0.11	0.03**	0.01
<i>FOREIGN<sub>i,t</sub></i>	0.50**	0.33	0.70**	0.26
Firm Fixed effects	Yes		Yes	
Time dummies	Yes		Yes	
Adjusted R <sup>2</sup>	0.55		0.64	
No. of observation	6,180		6,180	

Among the regression models, the adjusted R<sup>2</sup> increased from 0.41 to 0.66, and 0.64 in the models including three dimensions and the FACTOR for their joint effect respectively. While the enhancement in the adjusted R<sup>2</sup> indicates improved explanatory power of the model, but such enhancement may also contribute to the omitted variables. Accordingly, we performed the Hierarchical Regressions Tests among the models. Since the t-value from running the tests is significant at 0.1% level, the increased explanatory power is thus mainly contributed to the effect of including our three dimensions variables. Overall, it is suggested that, the three dimensions can jointly/simultaneously influence the executive pay structure in Chinese listed companies. Thus, our results are robust in both measurements of the three dimensions reference point.

With regard to the possible endogeneity problem, by the variable construction of external and time dimensions, the observations are of the lagged period, rather than the same observation period of the dependent variable, thus possible endogeneity problem is restricted. For the internal dimension, we further run 2SLS as an alternative estimation approach and the results remain robust with slight changes in the values of the coefficient and t-values. Table 6 reports the estimation results using 2SLS. The coefficient of the internal reference point variable is 1.44 and significant at 0.1% level and night of the control variables influence executive pay to certain significant level. The adjusted R<sup>2</sup> of the 2SLS estimation is 0.60, which is slightly different from main regression result.

Table 6. 2SLS Estimation Results.

<b>DEPENDENT VARIABLE: Executive cash compensation <math>LnComp_{i,t}</math></b>		
<b>INDEPENDENT VARIABLES</b>	<b>COEF.</b>	<b>STD.</b>
$INTERAL_{i,t}$	1.44***	0.05
$DUALITY_{i,t}$	0.11*	0.05
$CEOSHARE_{i,t}$	1.07***	0.25
$INDBOARD_{i,t}$	-0.06	0.25
$SUPERBOARD_{i,t}$	-0.01	0.01
$STATE_{i,t}$	-0.06*	0.03
$TOP5_{i,t}$	-0.21**	0.06
$ROA_{i,t}$	1.24***	0.14
$SIZE_{i,t}$	0.11***	0.02
$LEVERAGE_{i,t}$	-0.10*	0.05
$GROWTH_{i,t}$	0.03**	0.01
$FOREIGN_{i,t}$	0.66**	0.22
Firm Fixed effects		Yes
Time dummies		Yes
Adjusted R <sup>2</sup>		0.60
No. of observation		6,180

### C. Robustness Tests

In order to test the sensitivity of estimation results, we employ alternative proxies for some of the variables. Instead of using the average value, we introduce the median level of cash compensation of top three executives as well as the median in each of the three dimensions. The direction and significance of main variables remain unchanged and the results do not show any significant difference, while the results are not reported here.

Since the sampling period is across 6 years and the inflation factor might influence our results, we refer to China Statistical Yearbook and use the Price Indices to smooth out the possible inflation effects and re-run the regression. The estimation results (not report here) do not suggest significant differences.

## VI. CONCLUSION

Drawing from the perspective of reference point theory based on behaviour economics, we contribute to corporate governance literature on debate of the determinants of executive compensation from the Chinese perspective, given that compensation structure and institutional circumstance of Chinese listed firms are largely different from the Western economies, where are the focus of the most extant research on this issue.

We document positive relationship between the three dimensions of reference point and the average cash compensation received by the three highest paid executives in Chinese listed companies. In particular, the coefficient was 0.31, 0.32, and 0.28 for  $EXTERNAL_{i,t-1}$ ,  $INTERAL_{i,t}$ , and  $TIME_{i,t-1}$  respectively. We also find that, instead of working separately as a single vector, these three dimensions have the joint effect on top executive compensation contracting in China (the coefficient of  $FACTOR$  was 0.58). Overall, our findings demonstrate that when designing and/or investigating executive compensation in countries where the institutional environment is largely different from that in the U.S, especially in China, the effects of different reference points also need to be considered other than performance alone.

An important policy implication of our findings is that they demonstrate the need for the Chinese authorities to realise the effects of different reference point dimensions on the executive pay structure and further avoid inflating the market for top executives due to the irrational use of overweighed performance-based pay. In addition, in order to make the remuneration committee to be an effective function in designing executive pay, the need for further governance reforms of enhancing the power and formalising the operating measurements for the committee are sought.

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