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CEO pay upside down and enterprise performance: evidence from A-share listed companies in China

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Abstract: *This paper investigates the phenomenon of chief executive officer (CEO) pay upside down within China's listed companies and examines its impact on enterprise performance. Using the data of Chinese A-share listed firms from 2010-2019, this paper finds that CEO pay upside down negatively influences enterprise performance. Moreover, evidences show that (1) non-state-owned enterprise performance is more compromised by the inverted pay-position arrangement than state-owned enterprise performance; (2) when CEO's shareholding percentage rising, the negative effect of CEO pay upside down on enterprise performance will be more restricted; (3) in the region with higher level of marketization, the inverted pay-position contract discounts more enterprise performance; furthermore, this moderating effect of the level of marketization is weaker in state-owned firms. This study adds to the literature about compensate incentive by investigating the effect of the negative pay gap and provides empirical evidences for enterprises to formulate effective compensation mechanisms.*

Keywords: *CEO, Pay upside down, Compensation, State-owned, Marketization*

1. Introduction

Compensation of senior managers of listed companies has been concerned by the society. The effective compensation contract can motivate managers to undertake their functions and effectively support business operation, which is conducive to the improvement of enterprise performance. However, some pay chaos, such as "Sky Salary", "Zero Salary" and "Excess salary", frequently emerged in listed companies, which has aroused wide attentions and discussions (Yang et al., 2012; Fang, 2012). In addition, an alternative pay chao, chief executive officer (CEO) pay upside down, becomes prevalent in listed firms, however, attracting little attention. Generally, the manger team within a firm exits multiple administrative levels: CEO as the top executive of the firm is in the highest level; other managers are in the lower levels (Yu et al., 2019). The salary of a manager should increase with the improvement of administrative level (Rosen, 1986; Zhao, 2002). In the case, CEO should get the highest salary, but some of them gain less than their administrative subordinates. That is a pay chao of CEO pay upside down. Compensation incentive is thought one of the important internal incentive mechanisms in enterprises. However, the pay-position upside down may undermine the efficiency of compensation mechanism and lead to a failure of compensation incentive.

Compensation contract is designed to alleviate the conflict of interests between shareholders and management and reduce agency cost in the organization (Grossman et al., 1983). How to form an effective compensation contract has been a hot academic topic. Previous studies show that manager salary plays an important role in explaining enterprise performance; compensation mechanism will affect manager behavior, and then affect the operating efficiency and results (Kaplan, 1994; Sigler, 2011; Mo et al., 2010). Most studies argue that improving manager salary could enhance compensation incentive and facilitate enterprise performance (Fang, 2009; WU and WU, 2010). However, some studies hold that there is still a lack of sufficient evidences to confirm an existing relationship between them (Wei, 2010). Moreover, some researches take insight to the pay gap in the management team and investigates its effects on enterprise performance (Lin et al., 2003; Xia and Dong, 2014). Tournament theory and behavioral theory are two most used theories. However, the two theories support opposite views: tournament theory maintains that pay gap can strengthen compensation motivation and improve work efforts of the whole management team; behavioral theory argues that pay imbalance will make employees rise negative emotion and reduce work enthusiasm (Lazear and Rosen, 1981; Cowherd and Levine, 1992). Therefore, how pay gap in management affects enterprise performance has not attained a unanimous conclusion. Pay gap mostly investigated in previous studies is a positive gap where a superior manager has higher

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salary than their junior managers. Instead, CEO pay upside down refers to that CEO has lower salary can be thought a negative pay gap. However, the negative pay gap has attained little attention in compensation researches and how it influences enterprise performance remains an academic gap.

With the prevalence of CEO pay upside down, it becomes an important topic in the literature. To provide empirical evidences for the practical problem and make up the gap in research, taking a sample of A-listed companies from 2010 to 2019, this study examines the effect of CEO pay upside down on enterprise performance. Firstly, this study finds that pay-position upside down negatively influences enterprise performance. Next, this study suggests that non-state-owned enterprise performance is less compromised by the inversed payment arrangement than state-owned enterprise, owing to the substitution effect of political promotion incentive. Moreover, considering the role of equity incentive, this study observes that rising shareholding percentage of CEO is favorable to restrict the negative effect of pay upside down on enterprise performance. Finally, with the background of market-oriented reform in China, this paper finds that the inverted pay-position contract undermines more enterprise performance in the region with higher level of marketization; meanwhile, this undermining effect is weaker in state-owned firms.

This study contributes to research in four significant ways. First, it discusses the phenomenon of CEO pay upside down within China's listed companies, which little research has paid attention to. Second, it adds to the literature about compensate incentive by investigating the effect of negative pay gap between the CEO and junior managers. Previous researches mainly focus on the positive gap in management team. This paper takes insight to the negative pay gap and provides empirical evidences of its impacts on enterprise performance. Third, it also provides supplementary evidences for the substitution effects of political promotion incentive and equity incentive for salary monetary compensation incentive. Fourth, it verifies the severer impacts caused by inverted pay-position contract in highly marketized regions and implies the necessary for salary marketization within a firm.

The rest of the paper is organized as follows. Section 2 proposes the research hypotheses. Section 3 presents the methodology. Section 4 introduces empirical results and analysis. Section 5 concludes the paper.

2. Hypothesis Development

Upper echelons theory suggests that the top management team plays a critical role in activities of business operation and management (Hambrick and Mason, 1986). How to design an effective compensation contract of the management team is one of the core issues of corporate governance. Especially, members with different positions in the team are unique individuals so that they are determined to be arranged with different compensation plans to maximize the function of compensation mechanism. According to the position responsibility and rights, team member can be classified into several administrative levels where the top manager who is the core leader in the company is in the first level and the other junior managers are in the second level (Miao and Hu, 2014). Among the manager team, the salary of a manager should increase with the improvement of his administrative level. Thus, CEO's salary is supposed to be higher than salary of any other team member. However, CEOs in some listed firms are found to gain less than their administrative subordinates. That is the so-called phenomenon of CEO pay upside down. Obviously, it is an abnormal compensation arrangement that may destroy and invalidate the function of salary incentive mechanism. Behavioral theory suggests that the internal pay gap affects the sense of psychological fairness of managers and further affects their work efforts and efficiencies (Cowherd and Levine, 1992). CEOs used to think they deserve the highest payment for the identity, work effort or social evaluation. If CEOs earn less than their than their administrative subordinates, they will feel unfairly treated, thus rising negative emotions and even refusing to cooperate with other team members; it eventually damages enterprise performance (Yu, et al., 2019). Tournament theory argues, for other low-level managers, the positive pay gap within the management team can encourage them to pay more efforts into business activities for the purpose of promotion (Lazear and Rosen, 1981). While, they will have no longer such motivation if they expect a relatively low level of salary of superior CEO. These managers tend to feel satisfied with current situations and reluctant to pay much work effort for promotion, which is not conducive to enterprise performance. Based on the analysis, this paper proposes the following hypothesis:

H1. CEO pay upside down is negatively correlated with enterprise performance.

Firms in the market of China can be divided into state-owned firms or non-state-owned firms according to the ownerships. For both types of forms, the pay chao of CEO pay upside down is potential

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to emerge but lead to differential influence on enterprise performance. Specifically, state-owned CEOs are thought both "Economic men" and "Political men"(Wang et al., 2014). On the one hand, as top managers, they totally concern about their economic remunerations from the leadership positions, such as high annual salaries; on the other hand, they have urgent appeals for political promotion (Yang et al., 2013). In fact, non-stated CEOs are doubly regulated in the manager market and compensation pricing, therefore, owning a relatively low annual payment (Grove et al. 1995; Chen et al., 2005). Due to the salary regulation, non-state-owned CEOs are more relied on political promotion to enjoy improved power satisfactions, status glories, etc. (Chen et al., 2010). Furthermore, the incentive for political promotion is an important remedy for state-owned managers, which is conducive to the improvement of enterprise performance (Cao et al., 2011). In the case, for state-owned firms, the incentive failure caused by CEO pay upside down is likely to be alleviated by CEO's appeal of political promotion. Similarly, Wang et al. (2014) provides empirical evidences: with the background of non-state-owned CEOs earning a low level of salaries, the higher possibility of CEO promotion is, the better the performance of enterprises is. Therefore, this paper argues that performance of state-owned enterprise is less compromised by CEO pay upside down because of the substitution effect of CEO political promotion incentive, thereby hypothesizing as follows:

H2. CEO pay upside down has less negative impact on enterprise performance in the state-owned enterprises.

Contrary to the unique incentive of political promotion of state-owned enterprises, equity incentive is a common method to motivate managers' efforts for the both types of firms. That managers hold company stocks is regarded as an effective way to reduce agency costs, coordinate the interests of managers and shareholders that and improve corporate performance (Jensen and Murphy, 1990; Feng and Zhao, 2012). As a top manager, a CEO is a critical object of equity incentive, thus holding more or less company stocks. This paper argues that the negative impact of CEO pay upside down on corporate performance is smaller if the CEO holds more company shares. First of all, when the CEO becomes a shareholder, his wealth derives from both monetary salaries and capital compensations related to holding stocks such as stock appreciation or dividends. Obtaining higher salaries and equity returns constitutes the two major sources of incentive for the CEO. When the pay chao of CEO pay upside down leads to the failure of salary incentive, the CEO is still encouraged to improve enterprise performance and maximize enterprise value for gaining capital returns of holding stocks. Furthermore, the annual salary of the CEO is constant in a short period; the capital returns of holding stocks will be a more dominant role in respect to salary compensation with an increasing number of shares. On the one hand, the CEO will have a lower sensitivity of the salary compensation, thus less affected by the inverted pay-position contract. On the other hand, the CEO are also more interested in improving corporate performance to increase equity returns (Liu and Wan, 2013). Accordingly, this paper the hypothesis:

H3. When CEO's shareholding ratio is higher, the negative impact of CEO pay upside down on enterprise performance is smaller.

Enterprises are embedded in specific institutional environments. A market-oriented reform is implemented to develop external institutional environments for enterprises in China. With the reform processing, the level of marketization becoming an important factor affecting the function of compensation mechanism of a company (Chen et al., 2019). Additionally, owing to differences in policy, resources, and geographic location, the degree of marketization varies greatly among China's regions. It implies that the relationship between CEO pay upside down and enterprise performance may exhibit differently under different levels of marketization. It is a possible explanation that if the CEO gets an unfair payment, and then he may produce negative emotions on work and even willing to leave the position; this discounts performance of the firm; meanwhile, the highly marketized external environment may strengthen this effect because it generally establishes a developed manager market allowing the CEO choosing employers freely. However, the manager market especially for state-owned CEOs is still regulated to a certain extent (Chen, et al., 2005). Specifically, state-owned CEOs are frequently appointed administratively by senior government officials and they have less chance changing jobs proactively when gaining an unmatched low payment. Following the analysis, this paper proposes these two hypotheses:

H4a. When the level of marketization is higher, the negative impact of CEO pay upside down on enterprise performance is smaller.

H4b. The influence of the level of marketization on the relationship between CEO pay upside down and enterprise performance is smaller in state-owned enterprises.

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3. Methodology

3.1 Data and sample

This study uses Chinese A-listed firms for the period of 2010–2019 as an initial sample. In China, some CEOs, especially ones of stated-owned enterprise, earn an abnormally less salary than non-CEO managers; this fact provides a condition for the research. From the database of China Stock Market and Accounting Research (CSMAR), this study obtains 439246 manager resumes of sample firms which describe annual salaries and positions of managers firmly and yearly. Additionally, the financial data of sample firms also derives from CSMAR and the level of regional marketization derives from the report of Marketization index in China (Wang et al., 2017). According to the research of Yu et al. (2019), this paper processes several steps on the initial sample: (1) excluding ST or * ST firms; (2) excluding the sample of financial industry; (3) excluding firms without a disclosure of CEO compensation; (3) excluding firms with missing financial dada; (4) some CEOs earn zero salary in listed entities but much form their related non-listed entities so that the annual salary of CEO represents a unreal compensation, therefore, excluding these observations; (5) removing the observations when the CEO changes; (6) in order to construct a difference-in-difference sample, this study eliminates these firm groups in which there is never an inverted pay-position or is always an inverted pay-position. Finally, a sample of 10708 firm-year observations is achieved in this study.

3.2 Measurement

3.2.1 Enterprise performance

Previous literatures generally use earnings per share (EPS), return on total assets (ROA), return on equity (ROE) or Tobin's Q value (TBQ) to measure the performance of a firm. Following the researches relevant to cooperate governance of Hao et al. (2018) and Lian et al. (2012), this study uses ROA and ROE as two proxies of enterprise performance.

3.2.2 CEO pay upside down

In listed companies of China, management positions are entitled different names. A unique "Chief Executive Officer", "General Manager" or "President" in a company is treated as CEO in this study. In accordance with Yu et al. (2019), this paper defines whether there is a CEO pay upside down (Paydown) in the company depending on whether the CEO annual salary is higher than the salaries of all non-CEO managers in a year. If true, it is considered no such an inverted pay-position; if not, then it suggests the inverted pay-position in the companies in the given year. In particular, non-CEO managers who serve as the chairman or receive zero salary are not applicable for the comparison.

3.2.3 Controlling variables

Referring to previous researches (Hao et al., 2018; Yu et al., 2019; Zhang et al., 2015), this study controls following variables that may affect enterprise performance: firm size (Size); financial leverage (Lev); growth opportunities (Growth); board size (Board); ownership concentration (Top1); the proportion of independent directors (Rinde); whether the chairman and manager are the same person (Dual). It also controls industry-fixed effect and year-fixed effect in the regression model. A detailed definition of variables appears in Table 1.

Table 1: Definitions of variables.

Variables	Definitions
ROA	Ratio of net income to total assets
ROE	Ratio of net income to net assets
Paydown	1 if CEO gain highest salary, and 0 otherwise
SOE	1 for state-owned companies, and 0 otherwise
CEOShare	Percentage of shares held by CEO
Marketization	Compiled marketization index
Size	Natural logarithm of total assets
Leverage	Ratio of total liabilities to total assets
Growth	Growth rate of sales revenue
Board	Total number of board members
TOP1	Percentage of shares held by the first majority shareholder
Rinde	Percentage of independent directors in the board
Dual	1 if the chairman and CEO is the same person, and 0 otherwise

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3.3 Model Design

This study tests the baseline hypothesis by using the following regression specification:

$$Performance_{i,t} = \alpha + \beta_1 Paydown_{i,t} + \beta_2 \sum control_{i,t} + IndustryFE + YearFE + \varepsilon_{i,t} \quad (1)$$

Where, $Performance_{i,t}$ is proxied by ROA and ROE of firm i in year t; $Paydown_{i,t}$ is a dummy, representing whether there is a situation of CEO pay upside down within firm i in the given year; $Controls_{i,t}$ refers to all controlling variables; IndustryFE and YearFE denote respectively the industry-fixed effect and the year-fixed effect. To reduce the impact of extreme values, all the continuous variables are winsorized at the 1st and 99th percentiles in all models. Based on the development of H1, this study expects a significantly negative coefficient of $Paydown_{i,t}$.

To test H2, this study divides the sample into two subsamples according to the distinguished ownerships: State-owned firms are classified into a group; non-state-owned firms are classified into other. Estimating Eq. (1) with the two subsamples, this study expects that the estimated coefficients of paydown ought to be obviously different for groups of distinguished ownerships where the coefficients are significantly negative smaller in absolute value or not significantly in the state-owned group, but significantly negatively in the non-state-owned group. Additionally, this study constructs Eq (2) to examine the moderating effect of CEO shareholding where CEO $share_{i,t}$ measures the ownership ratio of CEO within firm i in year t. The interaction term in the Eq. (2) equals times $Paydown_{i,t}$ multiplying decentralized $CEOshare_{i,t}$. According to H3, this study expects that increasing CEO shareholding is conductive to limit the baseline effect; thus, there ought to be a positive coefficient of the interaction term in Eq. (2) at a significant level. Eq. (3) is proposed to test H4 and H5 where $marketization_{i,t}$ represents the regional marketization index of registration province of firm i. The index for first 7 seven year derives from the report Wang et al. (2017) and the index for later years is assumed to increase at an average growth rate appearing in former years for each region (Feng et al, 2015). The interaction term in the Eq. (3) equals that $Paydown_{i,t}$ multiplies a decentralized $marketization_{i,t}$. Following H4, this study experts a significantly coefficient on the interaction term. Furthermore, The Eq. (3) is re-estimated using two above subsamples to test H5; The two estimated coefficients on the interaction term will indicate an ownership heterogeneity of the moderating effect of marketization level.

$$Performance_{i,t} = \alpha + \beta_1 Paydown_{i,t} + \beta_2 Paydown_{i,t} \times CEOshare_{i,t} + \beta_3 CEOshare_{i,t} + \beta_4 \sum control_{i,t} + IndustryFE + YearFE + \varepsilon_{i,t} \quad (2)$$

$$Performance_{i,t} = \alpha + \beta_1 Paydown_{i,t} + \beta_2 Paydown_{i,t} \times Marketization_{i,t} + \beta_3 Marketization_{i,t} + \beta_4 \sum control_{i,t} + IndustryFE + YearFE + \varepsilon_{i,t} \quad (3)$$

4. Empirical Results

4.1 Descriptive statistical analysis

Table 2: Sample distribution.

	State-owned		Non-state-owned		Total
	Paydown	Non-paydown	Paydown	Non-paydown	
2010	118	282	75	180	655
2011	125	266	137	299	827
2012	150	327	226	414	1117
2013	161	320	235	460	1176
2014	173	278	243	439	1133
2015	176	270	306	408	1160
2016	180	246	322	457	1205
2017	176	241	364	429	1210
2018	195	239	455	483	1372
2019	122	178	291	262	853
Total	3831	2654	2647	1576	10708

Table 2 reports the distribution of sample in terms of ownership and year. From the dimension of ownership, the sample obtains 4223 firm-year observations of state-owned enterprises and 6485 of non-

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state-enterprises. The pay chao of CEO pay upside down is thought more potential emerging in state-owned firms because of its specific salary system. However, this table shows the proportion of inverted pay-position in state-owned firms is more dominant than it's in non-state-owned firms; it suggests that the unmatched compensation of CEO of private firms is so underestimated that should not be ignored in the research. From the perspective of time series, it shows an overall incremental tendency of the pay chao in both types of enterprises.

Table 3 presents the descriptive statistical results of the variables. The median value of ROA is 0.036, indicating that more than half of firms are profitable and earn annual profits which exceeds 3% of total assets. Meanwhile, the mean value is 0.04 with a standard deviation of 0.49, thus implying a significance difference among sample firms. Additionally, the statistical results of ROE describe a similar profitability status of sample firms. According to the table, CEO pay upside down has a high possibility for incurring in listed-firms because of a mean value of 0.395 of Paydown. These firms are almost 40% state-owned and 60% non-state-owned. The mean value of CEOshare suggests each CEO holds averagely about 5% company shares; However, the median value is zero, indicating half of CEOs do not have the equity incentive. With the process of marketization in China, the average level of regional marketization has exceeded 8 while an index of 10 represents the region is highly marketized.

Table 3: Results of descriptive statistics.

Variable	N	Mean	Median	SD	Min	Max
ROA	10708	0.0400	0.0360	0.0490	-0.151	0.188
ROE	10708	0.0670	0.0680	0.0990	-0.468	0.306
Paydown	10708	0.395	0	0.489	0	1
SOE	10708	0.394	0	0.489	0	1
CEOshare	10242	0.0490	0	0.112	0	0.502
Marketization	10708	8.094	8.330	1.879	2.870	10.96
Size	10708	22.19	22.04	1.261	19.88	26.05
Leverage	10708	0.430	0.424	0.205	0.0510	0.866
Growth	10708	0.185	0.120	0.379	-0.508	2.276
Broad	10699	8.700	9	1.690	5	15
Top1	10708	0.350	0.336	0.146	0.0910	0.733
Rinde	10699	0.373	0.333	0.0530	0.333	0.571
Dual	10708	0.241	0	0.428	0	1

4.2 Correlation analysis

Table 4 displays the Pearson correlation coefficients of the variables. Evidently, Paydown is both significantly and negatively correlated with the measures of enterprise performance: ROA ($r = 0.026$, $P < 0.001$) and ROE ($r = 0.030$, $P < 0.001$). The results also show CEO shareholding percentage and the degree of marketization are positively correlated with ROA and ROE at the 1% significance level. Moreover, SOE is negatively correlated with Paydown, further confirming that the CEO in non-state-owned enterprises is more likely to receive an unmatched compensation compared to his position. The correlation coefficient between marketization and paydown is positive at the 1% significance, indicating compensation mechanisms of some companies, on the contrary, adversely go anti-marketization when external situations accelerate marketization.

Table 4: Correlation matrix of variables.

	ROA	ROE	Paydown	SOE	CEOshare	Marketization	Size	Leverage	Growth	Broad	Top1	Rinde	Dual
ROA	1												
ROE	0.869***	1											
Paydown	-0.026***	-0.030***	1										
SOE	-0.113***	-0.037***	-0.036***	1									
CEOshare	0.096***	0.037***	0.038***	-0.342***	1								
Marketization	0.077***	0.047***	0.056***	-0.232***	0.156***	1							
Size	-0.020**	0.127***	0.046***	0.343***	-0.260***	-0.00800	1						
Leverage	-0.362***	-0.106***	0.00200	0.320***	-0.232***	-0.116***	0.537***	1					
Growth	0.195***	0.217***	0.0120	-0.091***	0.059***	0.00800	0.033***	0.035***	1				
Broad	0.0100	0.045***	-0.0120	0.277***	-0.201***	-0.118***	0.304***	0.172***	-0.032***	1			
Top1	0.094***	0.117***	-0.00400	0.217***	0.0140	-0.030***	0.199***	0.077***	-0.0110	0.016*	1		
Rinde	-0.035***	-0.033***	0.0120	-0.049***	0.123***	0.026***	-0.0150	-0.0120	0.0160	-0.462***	0.035***	1	
Dual	0.046***	0.00300	0.020**	-0.309***	0.563***	0.144***	-0.197***	-0.165***	0.047***	-0.209***	-0.032***	0.129***	1

This table reports the Pearson correlation coefficients of variables. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

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4.3 Baseline regression results

Table 5 presents the results of baseline regressions in the first two columns. The results show that the coefficients of paydown are significantly negative at the 1% level, demonstrating that CEO pay upside down produces a significantly negative influence on enterprise performance. The finding is consistent with tournament theory and behavioral theory: an unmatched payment contract for a CEO will damage his work enthusiasm owing to the sense of unfairness or salary jealousy; the subordinate mangers are simultaneously less motived working hard for promotion. In terms of two measures of enterprise performance, ROE ($\beta = -0.006$, $P < 0.01$) would suffers a greater reduction than ROA ($\beta = -0.003$, $P < 0.01$) if the inverted pay-position compensation contract is carried out in the company; it highlights a more detrimental impact for returns of shareholders. Overall, H1 is supported.

Table 5: Results of baseline regressions and heterogeneous effects of ownership.

	Baseline		State-owned		Non-state-owned	
	ROA	ROE	ROA	ROE	ROA	ROE
Paydown	-0.003***	-0.006***	-0.001	-0.005*	-0.004***	-0.007***
	(0.001)	(0.002)	(0.001)	(0.003)	(0.001)	(0.002)
Size	0.010***	0.021***	0.009***	0.020***	0.011***	0.024***
	(0.000)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)
Leverage	-0.124***	-0.142***	-0.129***	-0.172***	-0.119***	-0.115***
	(0.003)	(0.008)	(0.005)	(0.013)	(0.004)	(0.011)
Growth	0.026***	0.054***	0.020***	0.052***	0.028***	0.053***
	(0.001)	(0.003)	(0.002)	(0.005)	(0.002)	(0.004)
Broad	0.000	-0.000	-0.000	-0.001	0.002***	0.003**
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
Top1	0.029***	0.058***	0.017***	0.032***	0.046***	0.093***
	(0.003)	(0.006)	(0.005)	(0.011)	(0.004)	(0.008)
Rinde	-0.034***	-0.071***	-0.043***	-0.097***	-0.001	-0.004
	(0.009)	(0.020)	(0.012)	(0.028)	(0.014)	(0.030)
Dual	0.002*	0.004*	0.001	-0.004	-0.000	0.001
	(0.001)	(0.002)	(0.002)	(0.006)	(0.001)	(0.002)
_cons	-0.118***	-0.319***	-0.110***	-0.306***	-0.177***	-0.440***
	(0.011)	(0.026)	(0.014)	(0.036)	(0.017)	(0.038)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
N	10677	10677	4204	4204	6473	6473
R^2	0.243	0.140	0.280	0.173	0.225	0.141

Robust t-values are shown in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

4.4 Moderating effect results

This study examines the moderating role of nature of property rights on the baseline effect by estimating the Eq. (1) with two distinguished subsamples. The results are shown in the later four columns in Table 5. In the sample of non-state-owned firms, it presents that paydown is significantly negative with ROA ($\beta = -0.004$, $P < 0.01$) and ROE ($\beta = -0.007$, $P < 0.01$); in the sample of state-owned firms, the coefficients of paydown are correspondingly -0.001($P > 0.1$) and -0.005($P<0.01$). These evidences suggest that the performance of state-owned enterprise is less impacted by the inverted pay-position arrangement, which may be explained by the substitution function of specific political promotion incentive. Thus, the evidences verify H2.

The first two columns in Table 6 reports the estimation results of how CEO shareholding percentage affects the relationship between CEO pay upside down and enterprise performance. It can be found that Paydown coefficients remain significantly negative and the cross-term of CEOshare and Paydown exhibits a positive relationship with ROA and ROE at the 1% level. Thereby, the cross-term is determined to undermine the basic negative relationship. That is, when the CEO holds higher percentage of company shares, the inverted pay-position contract will cause less negative consequence in terms of enterprise performance. Accordingly, H3 is supported.

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Table 6: Moderating effects of CEO shareholding percentage and the level of marketization.

	Moderating effect of CEO shareholding percentage		Moderating effect of the level of marketization					
	ROA	ROE	ROA	ROE	State-owned		Non-state-owned	
					ROA	ROE	ROA	ROE
Paydown	-0.003***	-0.007***	-0.003***	-0.006***	-0.001	-0.005*	-0.004***	-0.007***
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.003)	(0.001)	(0.002)
CEOShare ×Paydown	0.054***	0.085**						
	(0.019)	(0.036)						
CEOshare	0.019***	0.046***						
	(0.005)	(0.009)						
Marketization × Paydown			-0.007***	-0.014***	-0.000	-0.002	-0.011***	-0.021***
			(0.001)	(0.003)	(0.002)	(0.004)	(0.002)	(0.004)
Marketization			0.002***	0.003***	0.002***	0.004***	0.001***	0.001*
			(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
Size	0.010***	0.021***	0.010***	0.021***	0.009***	0.019***	0.012***	0.025***
	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)
Leverage	-0.124***	-0.142***	-0.123***	-0.139***	-0.127***	-0.167***	-0.119***	-0.115***
	(0.003)	(0.009)	(0.003)	(0.008)	(0.005)	(0.013)	(0.004)	(0.011)
Growth	0.026***	0.055***	0.026***	0.054***	0.020***	0.052***	0.028***	0.053***
	(0.001)	(0.003)	(0.001)	(0.003)	(0.002)	(0.005)	(0.002)	(0.004)
Broad	0.000	-0.000	0.000	-0.000	-0.000	-0.000	0.002***	0.002**
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
Top1	0.027***	0.052***	0.028***	0.056***	0.016***	0.030***	0.044***	0.089***
	(0.003)	(0.006)	(0.003)	(0.006)	(0.005)	(0.011)	(0.004)	(0.008)
Rinde	-0.033***	-0.069***	-0.032***	-0.068***	-0.038***	-0.087***	-0.002	-0.006
	(0.009)	(0.020)	(0.009)	(0.020)	(0.012)	(0.028)	(0.014)	(0.029)
Dual	-0.002	-0.004*	0.001	0.003	0.001	-0.005	-0.000	0.001
	(0.001)	(0.003)	(0.001)	(0.002)	(0.002)	(0.006)	(0.001)	(0.002)
_cons	-0.122***	-0.332***	-0.131***	-0.345***	-0.111***	-0.308***	-0.194***	-0.470***
	(0.011)	(0.027)	(0.011)	(0.026)	(0.014)	(0.036)	(0.018)	(0.039)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	10211	10211	10677	10677	4204	4204	6473	6473
R^2	0.245	0.143	0.247	0.145	0.284	0.176	0.232	0.147

Robust t-values are shown in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 6 also reports the regression results of Eq. (3) in the later columns. The first of two columns displays that the coefficients of paydown are significantly negative as expected and the term of paydown interacted with marketization are -0.007 ($P < 0.01$) in the ROA column and -0.014 ($P < 0.01$) in the ROE column. Contrary to the impact of CEO shares, the degree of regional marketization aggravates the negative effects of CEO pay upside down. The unmatched compensation contract is an anti-marketization arrangement, which causes worse effects on the internal management and discounts more seriously enterprise performance in the regions with higher level of marketization, hereby supporting H4a. The later of four columns presents the estimation results of Eq. (3) for the state-owned and non-state-owned groups. Evidently, coefficients of cross-term are not significant in the state-owned group, but significantly negative in the non-state-owned group; this suggests that the moderating effect of the level of marketization is stronger in the non-state-owned sample. It warns that non-state-owned enterprises should form marketized compensation systems, otherwise having higher risks for performance decline. This finding is consistent with H4b.

4.5 Robustness Tests

Three methods are undertaken for the robustness tests. Paydown is a dummy variable according to the definition of CEO pay upside down. Instead, this study uses a continuous proxy (Paydown_I) of it for the first robustness check. It is measured as a ratio of a salary difference to the CEO salary; the difference equals to the highest salary of non-CEO managers minus the CEO salary. Table 7 reports the baseline regression results in the first two columns. The coefficients of paydown are negative as at the 1% significance level, indicating the results are robust regard with to the measurement of the key independent variable. This paper investigates a synchronic relationship between CEO pay upside down and enterprise performance. However, compensation mechanism may cause lagging impacts on the

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individual and enterprise behavior (Zhang, 2008). This study thereby estimates the equation by logging independent and controlling variables for a period. The results are robust as shown in the middle two columns of Table 7. Finally, this study also tries to excluding interference of CEO shares on the conclusion, thus examining the effects based on a sample of firms from which CEOs only gain annual salaries. Table 7 reports the results for the test, which is still consistent with the basic conclusion.

Table 7: Results of robustness tests.

	Using a continuous measurement of CEO pay upside down		Lagging independents and controls for a year		Estimating with sample firms that CEO holds no shares	
	ROA	ROE	ROA	ROE	ROA	ROA
Paydwon			-0.002*	-0.005**	-0.002*	-0.009***
			(0.001)	(0.002)	(0.001)	(0.003)
Paydown_I	-0.002***	-0.005***				
	(0.001)	(0.002)				
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
N	10677	10677	7354	7354	4672	4672
R^2	0.226	0.117	0.132	0.053	0.211	0.115

Robust t-values are shown in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

6. Conclusion

In contrast to previous reports investigating the positive pay gap between a management team, this investigates the emerging phenomenon of CEO pay upside down, a negative pay gap, in companies. Using a sample of A-share listed firms for 2010 – 2019 in China, this finds the inverted pay-position arrangement will discount enterprise performance (proxied by ROA and ROE). It complements the research on compensation incentive by taking insight to the negative pay gap. Further, this study examines the negative of CEO pay up down with respect to firms of different ownerships. The results show the performance of non-state-owned firms is more likely decline compared to state-owned firms owing to CEO pay upside down, which can be explained by the substitution effect of political promotion incentive. This study also finds that if CEO own a higher proportion of the company's equity, the negative effect of the inverted pay-position contract on enterprise will be restricted because of the motivation of CEO for increasing individual equity returns. Finally, this study points that CEO pay upside down is an anti-marketization compensation arrangement; it causes more serious negative impact on enterprise performance in the regions with higher degree of marketization; specifically, with an inherent limitation of the manager market, state-owned enterprise is less influenced by the effect exerted by the increased level of marketization on the relationship between the inverted pay-position arrangement and enterprise performance. These findings enhance the understanding about how CEO pay upside down affects enterprise performance and provide extended empirical evidences for consequences of the negative pay gap in a management team.

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