Incentive Effect of Executive Compensation under the Reform of State-Owned Enterprise System——Empirical Research

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Abstract: *The special characteristics of state-owned enterprises (SOEs) among group enterprises make the status of their executive compensation and incentive mechanisms a hot issue of academic interest. This study selects a sample of 653 domestic SOEs in China from 2010 to 2020, classifies them into four categories of SOEs: commercial, public welfare, central, and local, based on the perspective of SOE system reform, and conducts regression analysis using a fixed-effects regression model to explore the effect of executive compensation incentives in SOEs under mixed ownership reform. It is found that the pay incentives for executives of SOEs are conducive to the improvement of the comprehensive performance assessment indexes of the enterprises, accompanied by the reduction of the agency costs of the enterprises. Further research finds that there are disparities in the pay of executives of SOEs of different natures, and the effects of pay incentives also have different effects. Based on the current situation of SOE executives' remuneration, the impact of executives' remuneration incentive effect on the performance and cost of SOEs is quantified and analyzed, to enlighten the study of SOE executives' remuneration incentive effect and find a realistic way of thinking to understand SOE executives' remuneration incentive effect under the socialist environment with Chinese characteristics.*

Keywords: *state-owned enterprise reform; executives; compensation; incentive effects*

1. Introduction

The reform of state-owned enterprises represents the general direction of institutional reform in China, and to date, the course of the reform of state-owned enterprises has lasted for nearly 40 years and has been the focus of institutional reform. State-owned enterprises are the compass of the country's economic stability, and their achievements in the reform journey have been quite fruitful, but there are still gaps in further achieving the reform goals. The reform of the remuneration system for executives of state-owned enterprises is an important part of the overall pattern of state-owned enterprise reform, which is of great significance in improving the pattern of income distribution within state-owned enterprises and promoting the formation and healthy and sustainable development of a reasonable salary system for state-owned enterprises. With the reform process of SOEs, the reform of the executive remuneration system has also achieved positive results, but the problems are still obvious, such as the high level of remuneration of executives of some SOEs, the unreasonable remuneration structure, the ineffectiveness of executive remuneration, and the efforts to improve the supervision and balance system. If these problems are not solved, they will affect the reform and development of SOEs and the fairness and objectivity of SOEs in the overall economic operation of the country. At present, academic research results on the reform of SOEs and the performance assessment and salary levels of SOE heads are abundant, but there is a relative lack of empirical analysis based on large samples. This paper will use the data of 653 SOEs from 2010-2020 to study the sensitivity of SOE executive pay incentives to enterprise performance and costs, which is one of the research contributions of this paper; secondly, in the model design, the regression analysis of fixed-effects model and mixed-effects model is introduced to study the effects of key performance assessment indicators such as total asset profit rate and economic value added on commercial SOEs, public welfare SOEs, central SOEs, and local SOEs on the sensitivity of executive pay performance, providing some empirical evidence on how to motivate executives in the reform of China's SOE system.

2. Analysis of the literature and research hypothesis

2.1. Relationship between executive compensation and corporate performance

Executive compensation generally consists of basic and incentive compensation, with basic compensation usually determined by factors such as firm size, the nature of control, the firm's geographic location, the industry in which it operates, and the executive's human capital characteristics (e.g., years of service, cultural background, etc.), while incentive compensation is usually linked to the executive's effort and contribution. Zhang J et al (2019). suggest that information asymmetry makes it difficult to directly observe executive effort and contribution, and thus executive compensation can be linked to observable firm performance [1]. Li J (2020) argues that the higher the proportion of incentive compensation in total executive compensation, the stronger the correlation and the higher the sensitivity between executive compensation and firm performance. Conversely, if a stronger sensitivity between executive compensation and firm performance is observed, it is known that the higher the incentive component of the executive compensation effect in that firm [2]. Bizjak (2011) argues that improved disclosure of corporate compensation information can effectively reduce adverse selection and unethical behavior of executives and facilitate the incentive effect of monetary compensation in firms [3]. Du Shine (2018) argues that disclosure of pay information can increase the transparency of payment information and increase one's income by investing in efficiency to increase the value of the firm, which in turn strengthens the sensitivity of monetary pay to firm performance [4]. Sheng S X (2018) argues that for the new round of SOE reform to be effective, it is necessary to adopt a market-based appraisal mechanism for executives and make dynamic adjustments to executive compensation based on SOE performance in conjunction with industry-wide market-based compensation [5]. Using A-share listed companies from 2010-2016 as a research sample, Liu Q et al. (2019) find that the accelerated marketization process gives SOEs more operational autonomy and promotes executive motivation, which in turn enhances the positive relationship between executive monetary compensation and corporate performance [6]. In this paper, assuming that the incentive setting of executive compensation is effective, then it can be expected that when other conditions are certain (e.g., macroeconomic environment, degree of industry competition), the incentive of compensation for executives will make executives corporate agents work hard and bring more performance growth or efficiency improvement to the firm and shareholders. That is, under certain pay level conditions, the stronger the intensity of performance incentives for executives in compensation, the more the firms' future performance growth or agency cost reduction. Taken together, the following hypothesis is proposed.

H1: When other things are certain, executive compensation in SOEs is positively related to firm performance and negatively related to agency costs.

2.2. The relationship between high and low performance and the effectiveness of executive compensation incentives among the four types of SOEs

State-owned enterprises, which are usually large due to their nature, bear a relatively large social responsibility in terms of policy and often encounter situations in which management is difficult and the interests of the enterprise conflict with those of the government and society. In the process of making strategic decisions about SOEs, the government often goes against the wishes of the shareholders of the enterprises to maximize their interests out of consideration for factors such as social stability and increasing the overall employment rate, and even in the process of promoting the classification reform of SOEs, key positions in SOEs in the public interest category or specific function category are still appointed by the government or senior executives are appointed by higher organizations and managed concerning about the civil service system(Cao S,2019) [7], resulting in a low degree of marketization of top governance This has led to a low degree of marketization of top governance. Local SOEs are slightly less involved in the lifeline of the national economy than public interest SOEs and SOEs with specific functions, and government intervention is relatively low, resulting in a lack of rule-based local SOEs, an unstable level of market competition, and a heavy personalization of some SOEs. Cheng Z M et al. (2020) argue that government intervention leads to a certain degree of market resource misallocation and significantly reduces the value of government-controlled firms [8]. Cai D et al. (2019) studied the relationship between government intervention and executive pay-performance sensitivity of SOEs and found that when SOEs are subject to excessive government intervention it affects the effectiveness of executive pay incentives, i.e., executives are not willing to work hard to get more compensation, which in turn affects the

pay-performance sensitivity [9]. Liu X et al. (2016) find that too much government control leads to low executive pay-performance sensitivity in SOEs, while with less government intervention and faster marketization, executive pay-performance sensitivity in SOEs increases significantly [10]. Zhi H Y et al. (2018) find that regions with faster marketization have a higher level of economic development, stronger enforcement of laws and regulations, and are more attractive to outside investors compared to regions with slower marketization, which in turn facilitates the role of corporate governance and drives executive compensation to be linked to performance [11]. In an empirical study with a sample of SOEs from 2006 - 2010, Shi S B et al.(2015) find that when SOEs implement diversification, the government is more inclined to participate in the management of less market-oriented central SOEs and public welfare SOEs than local SOEs with a higher degree of marketization, i.e., local SOEs have less government intervention and faster marketization compared to central SOEs and public welfare or function-specific SOEs, and executive The sensitivity of pay performance is stronger [12]. Zhang R J et al. (2017) suggest that the marketization process has enhanced the sensitivity of SOEs' pay incentives to firm performance and that monetary pay incentives for top executives motivate them to work harder and be more willing to take business risks [13]. As a result, top executives will be more cautious in making investment decisions, which is beneficial to the improvement of firm performance. Accordingly, the following hypothesis is formulated.

H2: When other conditions are certain, for the incentive effect of executive compensation, commercial SOEs have the highest performance growth due to incentives, followed by central SOEs, public interest SOEs again, and local SOEs last.

2.3. The interrelationship between executive compensation and agency costs

The principal-agent structure of SOEs is very complex, so the phenomenon of "overstepping" and "missing" executives are serious, which is very likely to generate high agency costs and is not conducive to the development of SOEs. The compensation contract is designed to align the interests of executives with those of shareholders, mitigate the agency conflict between shareholders and managers, reduce agency costs, improve resource allocation efficiency, and enhance the value of SOEs [14]. Jensen and Meckling (1976) point out that if the design of executive compensation is reasonable, it has an inverse relationship with agency costs [15]. Since there are agency costs between management and shareholders, management may compromise shareholders' interests for their benefit, such as concealing the true operating situation and making investment decisions in their favor, while executive compensation incentives play an effective role in reducing the agency costs of the firm. In a study, Firth (2016) concludes that executive compensation has a positive effect in privately held firms, while state-owned controlled public companies are unable to corroborate this effect [16]. The study by Bebchuk and Fried (2018) also provides further evidence that executives can influence the setting of individual pay through the power they possess, which is known as the managerial power theory [17]. The theory suggests that if executives can influence the setting of pay, they will increase on-the-job consumption with increased power or make failed decisions, thus reducing asset turnover and increasing the agency costs of the firm. Domestic scholars Wu Y H et al. (2017) also find that SOEs' agency costs do not decrease with an increase in executive monetary compensation, but rather increase [18]. In summary, the following hypothesis is proposed.

H3: When other things are certain, there is an inverse correlation between SOE executive compensation and agency costs, but the direction may not be fixed.

2.4. Relationship between executive compensation and variables such as firm size and gearing

Himmelberg and Hubbard (2013) argue that when executives with outstanding capabilities are more effective in a larger firm, that firm also can offer them more lucrative compensation. Since the operators hold the scale of the firm's operations, an increase in their competence may mean a large increase in firm value as well as their wealth [19]. Chip Fu et al. (2015) based on a study in the context of pay controls find that increased management power weakens the effectiveness of pay incentives, as evidenced by management receiving more monetary compensation but not necessarily good business performance [20]. Chen Z (2016) used total assets as a measure of firm size and found that the factor of firm size occupies an important position in the design of executive compensation contracts because operating performance in a firm does not accurately reflect the value of executive human capital, and the introduction of size indicators in the contract can play a role in supplementing information such as executive effort and ability, and further found that the growth environment in which the firm is located is related to executive Pay size sensitivity is positively related[21]. Zhou B C and Wang B X (2017)

studied the relationship between corporate governance, performance, and executive compensation and found that executive compensation is influenced by many factors such as firm size and industry wage levels [22]. Accordingly, the following hypothesis is proposed.

H4: When other conditions are certain, factors such as the pay gap between executive compensation and employees of SOEs, the size of the firm, the gearing ratio, and the percentage of executive shareholding all have an impact on firm performance, with a variable positive and negative proportional relationship of the impact.

3. Study design

3.1. Sample selection and data sources

The sample selected for this study is the enterprises in which SASAC and local people's governments act as performing principals or participate in the holding, selected for the period 2010-2020, and screened according to the following conditions: (1) exclude the data of the ST stock sample; (2) exclude the sample with abnormal and missing data; (3) exclude the enterprises with less than 3 persons in management. After screening, 653 SOEs with 9 years of data were finally extracted, totaling 4782 data. Among them, 152 commercial SOEs totaled 1,130 data, 145 public welfare SOEs totaled 1,054 data, 185 central SOEs totaled 1,331 data, and 171 local SOEs totaled 1,267 data. The data required for this study were obtained from Rexroth data, Wan De data, Guo Taian data, and SOE annual reports.

3.2 .Assessment indicators and model construction

3.2.1. Assessment indicators

According to the definition of the fiduciary subject in the principal-agent theory, the executives in this paper refer to the general managers of SOEs, meanwhile, the equity incentive and tenure incentive are not common in the existing SOE system, so this paper takes cash salary as the basis of research and assesses the executives of SOEs according to the annual performance index and tenure performance index. To test the effect of the appraisal so that the study is more reasonable and objective, based on tenure comparison analysis of the appraisal indexes, we focus on the effect of the pay incentive effect of the executives on the annual appraisal indexes of the enterprises for regression analysis. The main purpose is to understand the stage changes of executive compensation of SOEs by conducting a comparative analysis of the relevant indicators of executive compensation of SOEs in stages, regression analysis of fixed effects between executive compensation and performance indicators, and standardization of indicators such as total annual profit and economic value added divided by total assets at the beginning of the period in the analysis. In addition, the adjustment and refinement of indicator variables stage by stage and year by SASAC make small changes in performance indicators in each stage, so to make the empirical results more uniform, this paper sets a comprehensive annual performance assessment indicator KPI according to the assessment indicators and their weighting ratios in each stage. the formula for calculating KPI is as follows (Chen X and Ma L F,2014) [23]:

In the first and second terms, the annual business performance assessment indicators are total profit and economic value added, with the former assessed at 30 points and the latter assessed at 40 points, so that when the period in which the sample was taken was the first and second terms of the SOE assessment.

$$KPI = (3/7)*POA + (4/7)*EVA \qquad (1)$$

Where: KPI is a comprehensive annual performance assessment indicator; POA is total profit/total assets at the beginning of the period; EVA is economic value added

In the third term, the annual business performance assessment is total profit as net economic value added compared to the previous year, with an annual assessment score of 30 points for the former and 40 points for the latter. Thus, when the period in which the sample was taken was the third term of the SOE appraisal.

$$KPI = (3/7)*POA + (4/7)*EVAOA \qquad (2)$$

Where EVAOA is EVA/total assets at the beginning of the period, EVA is economic value added, and the rest of the indicators are as before.

In the fourth term, the basic assessment indexes were only slightly adjusted, but the assessment weights were changed, for total profit, except for military, electric power, and petroleum enterprises, which were 30 points, the share of total profit of other enterprises was reduced to 20 points; for economic value added, military, scientific research, and energy were 30 points, electric power, and petroleum and petrochemical enterprises were 40 points, and the share of all other enterprises rose to 50 points. Thus when the sample is in the fourth term.

If the sample is military, research, and energy companies:

$$KPI = (3/6)*POA + (3/6)*EVAOA \qquad (3)$$

If sample power, oil, and petrochemical companies:

$$KPI = (3/7)*POA + (4/7)*EVAOA \qquad (4)$$

If sample companies other than military, petrochemical, power, energy:

$$KPI = (2/7)*POA + (5/7)*EVAOA \qquad (5)$$

The remaining indicators are as before.

3.2.2. Model construction

The existing literature, when testing the effectiveness of executive compensation incentives, is mostly based on the effect of the current payment amount on the next period's performance. the pay level reflected by the payment amount is only one aspect of the pay incentive, while the incentive reflected by the pay-performance sensitivity is a more important factor to motivate managers to work hard because if the incentive factor is relatively lacking or less in the pay setting, I am afraid that the higher pay level will hardly bring the future performance growth of the enterprise. To conduct a quantitative and comparative analysis of the incentive effect of executive compensation in SOEs under the SOE system reform, this paper tests the effectiveness of the incentive effect of executive compensation in two aspects: firstly, it compares the performance sensitivity of executive compensation settings of various SOEs in the selected sample; secondly, it examines the impact of executive compensation levels on future performance and agency costs. Therefore, this paper constructs the following regression model.

$$KPI_{i,t+1} = \beta 0 + \beta 1\ InPay_{i,t} + \beta 2\ Gp_{i,t} + \beta 3\ Size_{i,t} + \beta 4\ Ten_{i,t} + \beta 5\ Area_{i,t} + \beta 6\ Lev_{i,t} + \beta 7\ Gsh_{i,t} + \Sigma Ind + \Sigma Year + \varepsilon_{i,t} \qquad (1)$$

$$AC_{i,t+1} = \beta 0 + \beta 1\ InPay_{i,t} + \beta 2\ Gp_{i,t} + \beta 3\ Size_{i,t} + \beta 4\ Ten_{i,t} + \beta 5\ Area_{i,t} + \beta 6\ Lev_{i,t} + \beta 7\ Gsh_{i,t} + \Sigma Ind + \Sigma Year + \varepsilon_{i,t} \qquad (2)$$

The variable definitions and variable descriptions for the two types of models mentioned above are shown in Table 1 below.

Table 1: Variable definitions and descriptions

	Variable symbol	Variable Name	Variable Description
Explained variables	Pay	Executive Compensation	Annual compensation for executives
Explanatory variables	Inpay	Natural logarithm of executive compensation	Natural logarithm of annual compensation for executives
Explanatory variables	KPI	Comprehensive business performance assessment	Integrated performance assessment indicators
Explanatory variables	AC	Cost of corporate representation	Total asset turnover ratio
Control variables	Gp	pay gap	Executive compensation/employee compensation
Control variables	Size	Business Size	Natural logarithm of total assets
Control variables	Ten	Number of years of senior management service	Number of days served/total number of days per year
Control variables	Area	The geographiLocationtion of the business	0 in the west, 1 in the center and 2 in the east
Control variables	Lev	gearing	Liabilities/total assets
Control variables	Gosh	Executive shareholding ratio	Number of shares held by executives/total number of shares

4. Empirical analysis

4.1. Analysis of executive compensation and corporate performance

Due to the differences between commercial SOEs and public interest SOEs, commercial SOEs are presented separately from public interest SOEs, as shown in Table 2. In terms of remuneration, the mean (median) value of executive remuneration of commercial SOEs is greater than that of public interest SOEs, but the maximum value occurs in public interest enterprises; in terms of annual basic performance assessment indicators, although the mean (median) value of total profits of commercial SOEs is much greater than that of public interest The mean value of total profit scaled by total assets at the beginning of the period is smaller than the corresponding value of public interest SOEs after considering the size of assets. related to the larger share of occupancy. In terms of the basic performance assessment indicators of tenure, the capital preservation and appreciation rate of commercial SOEs is not significantly different from that of public-good SOEs, the mean (median) of the growth rate of main business income is higher than that of public-good SOEs, and the mean (median) of the total asset turnover rate is lower than the corresponding value of public-good SOEs, which indicates that commercial SOEs have slow depreciation of non-current assets such as fixed assets. Operating efficiency is insufficient and agency costs are higher compared to SOEs in the public good category. the mean value of KPI is not significantly different between the two groups of samples because the distribution of each performance indicator used to calculate KPI is not the same between the two groups of samples and there are slight differences, such as ROE and EVAOA of SOEs in the commercial category are significantly greater than those in the public good category, but POA is smaller than the latter.

Table 2: Descriptive statistics of executive compensation and key performance variables in SOEs

variable		Business/pro bono	average value	median	(statistics) standard deviation	minimum value	maximum value	Number of samples
pay	Executive compensation ($ million)	public good	134.5226***	75.8***	89.7986	2.1	1300	4897
		trade	210.7***	165***	154.5	21.67	670	534
TP	Total profit ($ million)	public good	14620.441***	431.771***	185468.3	-197.665	6500000	3578
		trade	93405.56***	57549***	132012.5	-132.632	457600	678
POA	Total profit after scale-up of total assets at the beginning of the period	public good	3.1095***	0.6789***	0.2431	-189547	4.7896	4390
		trade	5.5617***	0.1478***	0.1458	564.9	1.765	599
EVA	Economic value added (millions of dollars)	public good	671.5432***	9.678***	6589.166	-43110.5	126265.66	5610
		trade	76245.76***	32987.13***	63180.98	-5689.53	167890	645
EVAOA	Economic value added after scaling up of total assets at the beginning of the period	public good	0.2456***	0.8971***	0.6709	-3.1389	2.5024	4879
		trade	0.3745***	0.4302***	0.7685	-0.8654	1.338	577
Euigr	Capital preservation and appreciation rate	public good	3.3987	3.0765	5.4327	-5.5086	323.967	6210
		trade	3.8998	3.7861	1.6509	1.345	7.057	641
Mincmgr	The growth rate of main business income	public good	0.6231**	0.7864***	4.653	-1.341	303.811	5879
		trade	2.543**	0.654**	7.985	-1.439	56.78	556
AC	Total asset turnover ratio	public good	0.9214***	0.7543***	1.5432	0.432	6.8726	5651
		trade	0.8658***	0.245***	0.862	0.547	1.287	587
KPI	Performance composite index	public good	0.1072	0.337*	0.6872	-4.796	21.2361	5568
		trade	0.2135	0.421*	0.5649	-0.7654	0.7765	631

Note: One-way tests of differences between the means (medians) of the values of each variable for firms in the business category and the corresponding values for firms in the public goods category were conducted, with ***, **, and * indicating that the difference is significant at the 0.01, 0.05, and 0.1 levels, respectively.

To gain a deeper understanding of the executive compensation of SOEs and the magnitude of the impact of executives on various indicators of enterprises, this paper will account for and analyze a series of indicators for central SOEs and local SOEs based on the subdivision of commercial SOEs and public welfare SOEs. local enterprises controlled by local governments. Therefore, within the institutional framework of SOEs, based on the available information, this paper divides the variable assessment terms of central SOEs and local SOEs into four phases: the first term assessment phase (T1)

includes 2010-2012; the second term assessment phase (T2) includes 2013-2015; the third term assessment phase (T3) includes 2016-2018; the fourth term appraisal phase (T4) includes 2019-2020 (some data for this year are missing, so only partial data are included); this information can be organized by the actual performance of the variables in each phase thus achieving the purpose of analyzing future trends.

Tables 3 and Table 4 show the mean and median distributions of annual and tenure appraisal stages of executive compensation for each comparative sample group, respectively, and in general, executive compensation in each sample group tends to increase year by year. Compared with the central SOEs and local SOEs, the mean (median) of executive compensation in each year of the central SOEs is significantly higher than that of the local SOEs, and the mean and median of the central SOEs are significantly higher than that of the local SOEs in the T1 and T2 stages; however, after the T3 stage, the mean and median of the central SOEs gradually decrease in increase and begin to converge with the local SOEs, but the median is still higher, only the gap in the median is narrowing year by year. This indicates that after 2015, the executive remuneration of some central SOEs has substantially increased under the incentive mechanism, thus pulling up the average value of their executive remuneration. In contrast, the mean value of local SOEs' executive pay is lower and rises slowly between 2010 and 2015, and the median has increased significantly from the T2 stage, and the difference is enlarging year by year, which implies that local governments have strengthened the incentives for local SOE executives in recent years.

Table 3: Annual distribution of executive compensation: central SOEs versus local SOEs Unit: RMB million

	year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Central State Enterprises	average value	45.9886	44.735	59.4784	67.4388	73.3035	86.3924	88.3412	85.6499	89.0744	93.5283
	median	22.78	35.65	45.43	37.51	55.65	66	76.335	69.96	70.715	74.03
	N	166	210	233	272	256	277	306	312	310	249
Local state-owned enterprises	year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	average value	22.7715	35.7919	34.7227	40.4122	51.6907	62.1182	64.5736	62.3092	75.1676	74.6112
	median	12.32	20.69	27	21.45	33.35	27.99	35.23	46.28	51	57.64
	N	486	473	492	529	516	546	557	555	584	404

Table 4: Stage distribution of executive compensation: central versus local enterprises Unit: RMB million

	stage	T1	T2	T3	T4		stage	T1	T2	T3	T4
centralized enterprise	average value	40.7165	61.1192	81.8236	89.2851	local business	average value	34.2576	49.6933	67.3696	79.0114
	median	34.07	49.9	65.8	72.32		median	29.03	40.12	54.645	63.3093
	N	306	591	725	449		N	951	1517	1638	978

(1) Total annual profit

Annual total profit is one of the business performance indicators in the performance appraisal of executives of Chinese enterprises in the Performance Appraisal Measures for Executives of State-owned Enterprises. To make comparisons between central SOEs and local SOEs, the ratio of annual total profits to total assets at the beginning of the period (total assets margin) is scaled in this paper. Table 5 presents the data distribution of the mean and median of annual total profits for each sample group at each stage of the study in Table A section, and the ratio of total profits to the opening balance of total assets in Table B section. From the stage distribution in the A table section, the annual total profits of central SOEs show an upward trend year by year, and the total profits of local SOEs fall back in the fourth stage; observing the annual distribution, it is found that the total profits of all types of enterprises fluctuate or even change in a negative direction when there are big economic policy adjustments and larger international trade policies in the country (e.g., inflation in 2018), but the executive compensation is all just rising and does not show a consistent pattern of change in total profits, i.e., executive compensation does not fall when profits fall instead it keeps changing in a positive direction. From the stage of T3, the total profits of central SOEs are in the stage of rapid growth in the distribution of mean and median, which coincides with the stage of rapid development of China's market economy, and in both indicators, central SOEs far exceed local SOEs, thanks to the inclination of national policies and the social responsibility undertaken by central SOEs. The remuneration of SOE executives (as seen in Table 4) flattens out in the mean and median of total asset profitability after the T3 stage and lags behind local SOEs in some years, indicating that the utilization efficiency of total assets of central SOEs is not as efficient as that of local SOEs, but the level of

executive remuneration has been rising and significantly higher than that of local SOEs. After 2016, the profitability of total assets of central SOEs is lower than that of local SOEs, but the median has been higher than that of local SOEs, which is consistent with the executive pay of central enterprises and that issued by local SOEs, indicating that the central government as well as the relevant departments of SASAC have an incentive effect on the setting of the pay of central SOE executives, and implying that local governments may exclude some elements, such as monopolistic competition.

Table 5: Phase distribution of total annual profits: central SOEs versus local SOEs

Stage		T1	T2	T3	T4	stage		T1	T2	T3	T4
A Total profit (in million)											
Central State Enterprises	average value	782.9138	857.396	2303.21	2536.29	Local state-owned enterprises	average value	249.9221	420.746	735.547	748.767
	median	79.8694	126.662	293.45	291.857		median	62.7601	109.313	177.066	190.481
B Total profit/total assets at beginning of a period											
Central State Enterprises	average value	0.0616	0.0752	0.0804	0.0584	Local state-owned enterprises	average value	0.047	0.0767	0.0954	0.0936
	median	0.0502	0.0618	0.0599	0.0487		median	0.0444	0.0539	0.0596	0.0476
	N	306	631	765	489		N	991	1557	1678	1018

Note: The number of samples in table A is the same as the number of samples in table B

(2) Economic value added

Since 2010 (i.e., the beginning of the first phase of this study's tenure), the Measures for the Performance Appraisal of SOE Executives' Remuneration adjusted the annual operating appraisal indicator for SOE executives from return on net assets to economic value added, implying that not only the increase in debt capital but also the increase or otherwise in equity capital is considered in the performance appraisal of SOEs (Zhao L and Wang K, 2019) [24]. Table 6 Part A of the table presents the stage distribution of the mean (median) value of economic value added for each sample group. The comparison between the mean and median of economic value added shows that the mean of each group of sample is much larger than the median at each stage (in multiples), indicating that the variation in economic value added among SOEs is relatively large (large standard deviation) and that most of the firms have low economic value added, probably because the flow of performance of firms during the initial trial period of economic value added is not on track, and the mean would be value-added corresponds to a higher value. Looking at the distribution of annual economic value added, similar to the total profit indicator, there is a clear jump in EVA for central SOEs and local SOEs in the third stage, with central SOEs showing a more pronounced performance.

Table 6: Stage distribution of economic value added: central SOEs versus local SOEs

stage		T1	T2	T3	T4	stage		T1	T2	T3	T4
An Economic value added (in millions of dollars)											
Central State Enterprises	average value	300.9427	192.039	833.566	638.67	Local state-owned enterprises	average value	112.6799	169.282	304.654	229.892
	median	-2.5504	9.7989	29.688	-2.7685		median	-8.7496	-2.3441	11.7679	-7.7512
B Economic value added/total assets at the beginning of the period											
Central State Enterprises	average value	-0.1029	0.107	0.1123	-0.102	**Local state-owned enterprises**	average value	-0.1094	0.1013	0.1163	0.1201
	median	-0.1023	0.1049	0.1056	-0.1015		median	-0.1068	-0.102	0.1038	-0.1027
	N	304	590	725	449		N	951	1565	1688	1068

Note: The sample size for each year for each type of enterprise in table A is the same as in table B

Since absolute numbers cannot be used for comparison, to facilitate comparative analysis between the two types of SOEs, this paper compares central SOEs with local SOEs by dividing the share of economic value added by the total assets at the beginning of the period, which is a relative number indicator and is presented in the B table section. Through data comparison and research, it is found that after considering the size, the advantage of central SOEs over local SOEs in terms of economic value added is drastically reduced, and after a round of increase in T3 stage to T4 stage (that is, in the last one or two years), there is a small decline compared with the previous one, mainly due to the more precise and detailed modification of the formula of economic value added by SASAC in recent years. A small change has occurred.

(3) Basic indicators for tenure assessment

Table 7 shows the distribution of the basic indicator stages of the tenure appraisal of the executives of SOEs in the Management Measures of Executive Compensation Incentives of SOEs, respectively.

Since the financial data in recent years are affected by objective factors, the sample size collected is small, but based on the principle of completeness, all the data collected in the T1-T4 stages are listed, but the data in the T1-T3 stages are more objective in comparison.

Table 7: Stage distribution of basic tenure appraisal indicators: central SOEs versus local SOEs

stage		T1	T2	T3	T4	stage		T1	T2	T3	T4
Capital preservation and appreciation rate											
Central State Enterprises	average value	3.834	4.341	4.436	5.162	Local state-owned enterprises	average value	3.639	4.842	6.295	9.07
	median	3.44	3.085	4.274	4.852		median	3.039	3.073	5.872	5.355
	N	386	597	895	633		N	1241	1907	2627	2968
B Total asset turnover ratio											
Central State Enterprises	average value	2.881	3.844	3.862	5.807	Local state-owned enterprises	average value	1.747	2.784	3.789	4.733
	median	2.707	2.676	3.705	4.638		median	1.571	2.634	3.659	4.594
The c Growth rate of main business income											
Central State Enterprises	average value	0.536	0.633	0.755	0.743	Local state-owned enterprises	average value	0.344	0.654	0.83	0.882
	median	0.377	0.588	0.757	0.679		median	0.427	0.413	0.653	0.561

Note: Tables A, B, and C show the same sample of Chinese enterprises for each year.

The integrated level of the efficiency and security of capital operations of State-owned enterprises is reflected by the capital preservation ratio. The ratio of the enterprise's capital preservation and appreciation rate, i.e. the ratio of the owner's equity at the beginning of the period to the owner's equity at the end of the period, reflects the changes in the actual interests of the enterprise's capital under the operation of the enterprise's production and operation in the current year, and also reflects the capital preservation and capital growth resulting from the investment of the state and individual investors in the capital of state-owned enterprises in the current year. The higher the capital preservation ratio of the enterprise, the better the profitability of the enterprise, the higher the degree of capital preservation, and the faster the growth of owner's equity. As a result, the more secure the creditors' debts are, i.e., the better the future strength and prospects of the SOE's development. In terms of capital appreciation preservation shown in part A of the above table, the capital appreciation preservation rate of both central SOEs and local SOEs hold an increase in the T1-T4 stage, and the growth of both is equal in the T1-T2 stage, from the T3 stage onwards, the capital appreciation preservation rate of central SOEs is higher than that of local SOEs, but local SOEs usher in a substantial increase in T4 stage, resulting in their mean value rising to 9.0695, with the median increase remaining the same or even decreasing slightly from the previous stages, while central SOEs grew slowly in comparison, holding a uniform growth rate.

In the enterprise investment asset efficiency evaluation, the percentage of total asset turnover can reflect the enterprise's efficiency level, in a certain time, the enterprise investment scale and sales level in fixed assets can be measured by the ratio between the amount of business income and total assets during the year, when the enterprise's asset investment profitability level increases, then the enterprise's sales capacity is also positively improved. Through the index analysis of total asset turnover, it can observe the change in the utilization rate of total assets of the enterprise in the current year compared with the previous years, to find the gap with similar enterprises or the previous years of this enterprise, and play the role of motivating the enterprise to generate income, explore the potential of the enterprise and improve the market share. As can be seen from part B of the above table, the mean and median of the total asset turnover rate of central enterprises are higher than that of local SOEs, indicating that the turnover rate of central SOEs is higher than that of local SOEs at all stages in terms of total asset utilization.

In China, the development stage of SOEs is mainly measured by the growth rate of their main business, which is used to determine whether the SOE is in a period of decline, whether it should embark on product renewal, and whether it needs to make strategic substitutions and transformations to respond to domestic market risks and the international economic environment on time. Generally speaking, if the growth rate of an enterprise's main business exceeds 10%, it indicates that the enterprise is in a rapid growth period. From the results presented in the main business revenue growth rate in Part C of the above table, both central SOEs and local SOEs have declined significantly in 2019, especially the central SOEs. The mean value of the growth rate of main business revenue of central SOEs is lower than that of local SOEs at T3 and T4, but the median value is higher than that of local SOEs, which indicates that the growth rate of main business revenue of more than half of local SOEs is not as high as that of central SOEs, which is related to various factors such as the allocation of state-owned resources, the direction of state-owned funds, and the competitiveness of local SOEs, and

also indicates that in terms of growth, high-growth enterprises are mostly in central SOEs. Local SOEs are mostly in the transition or strategic maintenance phase.

(4) correlation analysis between executive compensation and basic indicators of performance assessment of state-owned enterprises

Table 8 shows the correlations between SOE executives and the basic assessment indicators listed in the Measures for the Management of Executive Compensation Incentives of State-owned Enterprises, respectively. From this table, it can be seen that, in general, from 2010 to 2019, the remuneration of SOE executives is positively related to the annual total profit, economic value added, capital preservation and appreciation rate, total asset turnover rate, and growth rate of main business income, respectively, but the growth correlation of total asset turnover rate is slightly weaker than the other indicators. Except for the weak degree of correlation of total asset turnover rate and growth rate of main business income, all other indicators have significant positive relationships, so the data of the indicators derived above and the remuneration of executives of SOEs are substituted into the regression equation in the later section for analysis.

Table 8: Correlation analysis of executive compensation and assessment of basic performance indicators in SOEs

	Pay	POA	EVAOA	Mincmgr	Euigr	AC
Pay	1					
POA	0.2870***	1				
EVAOA	0.3946***	0.8318**	1			
Mincmgr	0.1457**	0.2695***	0.4671***	1		
Euigr	0.1358***	0.3540***	0.5087**	0.6507***	1	
AC	0.2307**	0.2497*	0.3652***	0.1851***	0.2853**	1

Note: ***, **, * represent significant at the 1%, 5%, and 10% levels, respectively.

4.2. Comparison of the performance sensitivity of executive compensation settings

In the empirical analysis, data can be quantified as its significant feature, and for the two types of assessment indicators of the executives of state-owned enterprises, the tenure assessment indicators are specific considerations of the actual working years, and it is impossible to quantify the desired results with numbers and indicators, so this study in this part on the regression analysis of executive compensation incentives only analyze the annual performance assessment indicators, using data to quantify the good and bad performance assessment. Among the basic indicators of annual performance appraisal, total profit and economic value added are the main appraisal indicators, and considering the impact caused by the difference in the size of different enterprises, the total annual profit of the enterprise after the scale of total assets at the beginning of the period (i.e., total assets profit ratio POA) is the main indicator in the pay incentive regression, while observing the relationship between the pay of executives of SOEs and the economic value added of the enterprise.

Table 9 presents the results of the sensitivity regression analysis of the profitability of total assets (POA) on executive compensation settings for various types of SOEs, which are analyzed in this paper using the results of the fixed effects regression, with the results of the mixed effects analysis as the comparison parameters. Among them, fixed-effects regression refers to the comparative analysis with only the existing selected sets of parameters, the purpose is only to study the differences between the selected parameters, not to extend to other parameters, and the conclusions are limited to these parameters, which are fixed and not randomly selected. From the fixed effects regression results in the table, it is clear that the total executive compensation of SOEs in the commercial category is significantly and positively correlated with the performance indicator POA in the current period; the executive compensation of SOEs in the public interest category is significantly and positively correlated with the performance indicator POAt-1 in the previous period and the total asset turnover ratio AC (reverse agency relationship of agency costs); the executive compensation of central SOEs is more significantly correlated with the performance POA compared to local SOEs, which includes current period performance and prior period performance, while central SOEs have the most significant incentive embodiment for executive compensation setting, which has a significant relationship with current period performance, prior period performance and agency costs. In terms of the relationship between executive compensation and AC, compared to local SOEs, central SOEs have significantly less significant agency cost factors considered in executive compensation settings. In addition, executive compensation of commercial SOEs and public interest SOEs is significantly related to firm size; except for commercial firms, executive compensation of all firms is positively related to the

length of tenure of executives.

Table 9: Comparison of performance sensitivity of executive compensation settings to POA

	Mixed effects regression analysis				Fixed effects regression analysis			
	Business-type SOEs	Public Benefit SOEs	Central State Enterprises	Local state-owned enterprises	Business-type SOEs	Public Benefit SOEs	Central State Enterprises	Local state-owned enterprises
intercept term	10.9056***	7.5568***	8.4321***	7.2632***	14.0075***	9.7665***	9.6595***	9.1045**
POA	0.8974 (2.15)	0.3089 (0.85)	0.8335** (4.41)	0.6175** (2.12)	1.7052** (2.47)	0.0065 (0.31)	0.6548** (4.01)	0.3432 (2.65)
POAt-1	0.5684 (0.93)	0.6154 (1.63)	1.6543** (9.87)	1.0216* (4.12)	0.8675 (1.43)	0.7782** (2.53)	0.8859 (5.91)	0.3179** (3.51)
AC	0.0651** (0.53)	0.2135* (4.82)	-0.2445 (-1.86)	0.3388** (11.67)	0.0217* (0.76)	0.0785 (1.96)	-0.3569** (-1.45)	0.4516* (5.94)
Size	0.4258** (6.86)	0.2147* (4.89)	0.2852** (13.54)	0.1675 (6.84)	0.1023** (1.26)	0.05811	0.1435** (3.76)	0.1854 (8.43)
Ten	0.0329* (0.21)	0.0654** (4.27)	0.0569* (6.32)	0.0452** (5.87)	0.0135 (0.65)	0.0567** (3.15)	0.0412** (4.34)	0.0215** (4.65)
Area	0.0265 (0.62)	0.0381 (1.02)	0.1643** (6.27)	0.1434 (5.76)				
year	control	control	control	control	control	control	control	control
industry	control	control	control	control	control	control	control	control
N	565	477	832	608	565	477	832	608
Adj R2	0.4359	0.4076	0.5321	0.4656	-	-	-	-
Within R2	-	-	-	-	0.2712	0.3421	0.4387	0.4069
F	8.3289	12.4561	24.0345	58.8918	6.8324	43.6512	31.231	75.7658

Note: *Significant at the 0.1 level; **Significant at the 0.05 level; ***Significant at the 0.01 level.

Table 10: Sensitivity Comparison of Integrated Performance KPIs for Executive Compensation Settings

	Mixed effects regression analysis				Fixed effects regression analysis			
	Business-type SOEs	Public Benefit SOEs	Central State Enterprises	Local state-owned enterprises	Business-type SOEs	Public Benefit SOEs	Central State Enterprises	Local state-owned enterprises
intercept term	9.6346***	7.8271***	8.1423***	7.2389***	13.6539***	9.3215***	8.1126***	7.0741***
KPI	2.3427*** (4.51)	1.2201*** (2.63)	1.7317*** (8.56)	1.6081*** (12.53)	2.5607*** (4.18)	0.5578* (1.76)	1.3219*** (6.54)	0.7219* (6.78)
KPIt-1	0.0561 (1.12)	0.0459 (0.51)	0.3213 (1.68)	0.0678 (1.32)	0.0537 (1.56)	0.0045 (0.24)	0.4341* (3.86)	0.0531** (2.24)
AC	0.210518	0.3042 (2.47)	0.0225** (0.42)	0.2531*** (9.56)	-0.1659 (-0.76)	0.4176 (2.18)	0.0532 (0.89)	0.2316** (13.76)
Size	0.1382** (6.45)	0.1976*** (6.67)	0.2316** (14.30)	0.2830*** (23.91)	0.0348 (0.32)	0.1747* (2.27)	0.2921** (6.67)	0.2925*** (10.89)
Ten	0.0386* (2.34)	0.0879** (4.61)	0.0766** (6.86)	0.0522** (6.97)	0.0299 (0.82)	0.0691** (3.83)	0.0542*** (5.42)	0.0317*** (5.21)
Area	0.0308 (0.62)	0.0593 (1.63)	0.2612*** (7.87)	0.2629* (13.81)				
year	control	control	control	control	control	control	control	control
industry	control	control	control	control	control	control	control	control
N	452	378	865	791	452	378	865	791
Adj R2	0.4571	0.4218	0.5389	0.5127	-	-	-	-
Within R2	-	-	-	-	0.2318	0.3421	0.4638	0.3629
F	15.3620***	21.6591***	73.7719***	46.7271***	7.7977***	24.7627***	61.7539***	52.0796***

Note: *Significant at the 0.1 level; **Significant at the 0.05 level; ***Significant at the 0.01 level.

Given that POA is only one of the performance assessment indicators of SASAC for SOEs, to further observe the implementation results of the relevant methods developed by SASAC, based on the above description of indicators, this paper analyzes the total remuneration of SOE executives with the comprehensive annual assessment performance indicator the KPI, and the results are shown in Table 10. According to the fixed effects regression results, it is found that the relationship between executive remuneration of commercial class SOEs and central SOEs and the KPI of the enterprise in the current period is significantly positively correlated, indicating that in the commercial category of SOEs and central SOEs, the setting factors for compensation include a certain degree of incentive, while on the contrary, the variable effect of agency cost AC relationship is not significant. In contrast, both the public interest category and local SOEs are significantly and positively related to AC, while executive

compensation in central SOEs is also significantly and positively related to both current and prior period KPI, indicating that central SOEs have more significant incentives compared to local SOEs.

4.3. Analysis of the effectiveness of executive compensation incentives

This section examines the incentive effects of executive compensation in SOEs in terms of the effects of pay levels on future performance and agency costs. Table 11 presents the results of comparing the impact of executive compensation levels on the next period's KPI comprehensive assessment performance for commercial SOEs, public interest SOEs, central SOEs, and local SOEs. According to the results of fixed effects regression analysis, executive compensation of commercial SOEs is significantly correlated with the next period's performance; local SOEs are significantly less correlated with the next period's performance compared to central SOEs, implying that there should be some degree of a positive relationship between higher executive compensation and firm performance; while the coefficients of executive compensation of public interest SOEs and local SOEs, although positive, are not significant. In addition, for the other control variables, it is found that the size of SOEs is significantly negatively related to the future performance of enterprises, i.e., the larger the size of the company, the lower the performance of the enterprise instead; meanwhile, the debt ratio of each type of company is positively related to the performance of the enterprise in the next period, indicating that the more debt raised by each type of company and the higher the gearing ratio, the higher the performance of the enterprise, which is particularly evident in commercial SOEs and central SOEs. However, this is a two-sided index, which does not reflect the performance level of executives. The shareholding ratio of executives in central SOEs is significantly positively correlated with corporate performance in the next period, implying that the equity incentive plans implemented by central SOEs can bring about improved performance; the pay gap of executives in all types of companies is negative, implying that different pay gaps between executives will harm the future KPI of the companies.

Table 11: Impact of executive compensation in state-owned enterprises on KPIs in the next period

KPIt+1	Mixed effects regression analysis				Fixed effects regression analysis			
	Business-type SOEs	Public Benefit SOEs	Central State Enterprises	Local state-owned enterprises	Business-type SOEs	Public Benefit SOEs	Central State Enterprises	Local state-owned enterprises
intercept term	0.0315 (0.25)	-0.1006 (-1.00)	-0.0563 (-0.98)	-0.2595 (-9.20)	1.5977** (3.79)	1.375*** (5.05)	1.4328* (9.43)	1.1010*** (13.30)
InPay	0.3124 (4.34)	0.0186** (2.73)	0.0395** (14.90)	0.0176*** (2.49)	0.0103* (1.04)	0.0037 (0.43)	0.1151** (8.02)	0.0169*** (3.89)
Size	-0.0126 (-0.82)	-0.0231 (-0.79)	-0.0267*** (-2.78)	-0.0106 (-0.37)	-0.0238*** (-4.25)	-0.0543*** (-4.36)	-0.0637** (-10.18)	-0.0610** (-6.57)
Lev	0.1761** (4.51)	0.0113 (0.47)	0.0046 (0.32)	0.0126* (1.73)	0.1592*** (2.87)	0.0876** (0.49)	0.1562*** (6.31)	0.0997*** (1.32)
Gsh	1.6667 (3.11)	0.8743 (0.90)	1.6839*** (2.96)	0.9554*** (5.62)	0.6789 (0.47)	5.3834* (1.58)	2.6410*** (1.06)	0.4877* (1.23)
Gp	-0.0506** (-2.16)	-0.0405*** (-2.44)	-0.0101 (-1.65)	-0.0202 (-2.05)	-0.0405** (-1.34)	-0.0106** (-1.37)	0.049569	-0.0702 (-0.92)
Area	0.0118 (0.27)	0.0315** (2.25)	-0.0107 (-0.14)	-0.0084** (-4.77)				
year	control	control	control	control	control	control	control	control
industry	control	control	control	control	control	control	control	control
N	565	423	612	489	565	423	612	489
Adj R2	0.2264	0.3158	0.1481	0.1725				
Within R2					0.2544	0.2816	0.2167	0.2405
F	16.3852	11.5159	8.0139	15.027	13.9266	9.5228	15.5221	27.3691

Note: *Significant at the 0.1 level; **Significant at the 0.05 level; ***Significant at the 0.01 level.

From the results of the above table analysis, it is clear that the annual comprehensive performance assessment levels of all four types of SOEs are positively correlated with executive compensation, with different degrees of correlation. Therefore, according to the total number of samples of the four types of SOEs, the next period of total profit level (POA), stage KPI, and economic value added (EVAOA) of the four stages of commercial SOEs, public welfare SOEs, central SOEs, and local SOEs are regressed and analyzed as shown in Table 12, and according to the results, it can be found that the executive compensation level of SOEs in each term has a positive relationship with the next period corporate performance indicators, that is An increase in the level of executive compensation can bring about an increase in the performance of the enterprise in the next period, but it is not absolute.

Table 12: Phase analysis of the impact of SOEs' total executive compensation on the next period's performance (KPIt+1)

	KPIt+1			
	T1	T2	T3	T4
intercept term	0.1222 (0.69)	0.1470 (1.37)	0.1872 (2.21)	0.3217*** (3.36)
InPay	0.0327*** (2.64)	0.0141*** (1.27)	0.1065 (4.46)	0.2163** (5.26)
Size	0.0169** (2.42)	0.0043 (1.05)	-0.0273** (-3.08)	-0.1068** (-2.18)
Lev	0.0323* (1.62)	0.0469* (1.02)	0.0664 (1.98)	0.0866*** (3.94)
Gsh	0.7239 (0.58)	-0.3063 (-0.26)	2.5658*** (4.08)	-1.2678** (2.03)
Gp	-0.1006*** (-1.83)	0.0103* (0.69)	0.1003** (2.15)	0.297*(-1.32)
Area	0.1029 (0.85)	-0.0339 (-1.60)	0.0723 (6.59)	0.4095*(1.80)
year	control	control	control	control
industry	control	control	control	control
N	326	452	587	646
Adj R2	0.1467	0.2062	0.1759	0.1067
F	2.7614	3.2074	2.1234	3.0366

Note: *Significant at the 0.1 level; **Significant at the 0.05 level; ***Significant at the 0.01 level.

Table 13: Phase analysis of the impact of SOEs' total executive compensation on the next period's performance (POAt+1)

	POAt+1			
	T1	T2	T3	T4
intercept term	0.0324 (0.02)	0.1457 (1.75)	0.2011*** (2.35)	-0.2943** (-2.87)
InPay	0.1927*** (2.64)	0.0189*** (1.34)	0.0267 (1.46)	0.0195*** (2.76)
Size	0.027405	-0.0161*** (-2.82)	-0.0131*** (-4.25)	0.0153 (1.58)
Lev	-0.0370 (-1.05)	-0.0250 (-0.69)	-0.0349 (-0.64)	-0.1419*** (-5.17)
Gsh	0.3270 (0.20)	-2.6391** (-2.48)	2.4691** (2.24)	2.5024** (2.30)
Gp	-0.0267** (-1.99)	0.032809	0.0104** (1.15)	0.0221 (1.08)
Area	0.0068 (0.52)	0.0041 (0.62)	0.0043 (1.03)	-0.0168 (-0.65)
year	control	control	control	control
industry	control	control	control	control
N	533	616	752	897
Adj R2	0.0404	0.0792	0.0648	0.1822
F	3.3967	2.6085	3.918	4.2051

Note: *Significant at the 0.1 level; **Significant at the 0.05 level; ***Significant at the 0.01 level.

Table 14: Phase analysis of the impact of total executive compensation of SOEs on the next period's performance (EVAOAt+1)

	EVAOAt+1			
	T1	T2	T3	T4
intercept term	-0.3092 (-0.79)	-0.1570 (-1.47)	-0.2170 (-2.37)	-0.4297*** (-2.36)
InPay	0.0527*** (2.64)	0.0341*** (2.07)	0.0265 (1.36)	0.0273** (1.26)
Size	-0.0179** (-2.32)	-0.0083 (-1.05)	-0.0241*** (-4.35)	0.0453 (1.58)
Lev	0.0823* (1.82)	0.045756	-0.0264 (-0.58)	-0.0766*** (-3.54)
Gsh	0.3769 (0.25)	-2.3591** (-2.28)	2.1691** (2.04)	2.1024** (2.37)
Gp	-0.1037** (-1.29)	0.031304	0.0024** (1.35)	0.0071 (1.13)
Area	0.0148 (0.82)	0.0241 (0.49)	0.0161 (1.43)	-0.0168 (-1.74)
year	control	control	control	control
industry	control	control	control	control
N	384	461	672	796
Adj R2	0.1108	0.1864	0.2298	0.3603
F	1.4251	2.9438	3.4172	4.2421

Note: *Significant at the 0.1 level; **Significant at the 0.05 level; ***Significant at the 0.01 level.

Table 15 presents the regression results of the impact of executive total pay level on the inverse variable of agency cost (total asset turnover) in the next period for four types of SOEs: commercial SOEs, public interest SOEs, central SOEs, and local SOEs. According to the fixed effects regression results show that the executive pay of the above four types of SOEs shows a positive correlation with ACt+1, and this positive correlation is overly evident in local SOEs, and the executive pay level shows a positive correlation with the total asset turnover rate in the next period at the level of 1-2%, that is, the higher the executive pay level in the current period will bring lower agency costs in the next period,

then it is expressed as enterprises are more efficient, and although public interest SOEs exhibit a positive executive compensation coefficient, the positive correlation is not significant, indicating that in public interest enterprises, the next period's agency costs of executives and the level of compensation have little influence on each other. In addition, according to the results, it can be seen that there is a negative relationship between the size of the enterprise and the total asset turnover ratio, and the smaller the size of the enterprise, the faster the asset turnover will be. Debt ratio has a significant positive relationship with total assets of central SOEs, which indicates that in central SOEs, an increase in debt ratio reduces agency costs; meanwhile, both equity incentive policies for executives and pay disparity between executives of various job levels show positive effects in reducing agency costs. The above results indicate that executive compensation incentives are stronger for commercial SOEs and local SOEs than for public interest SOEs and central SOEs, and executive compensation is significantly related to next-period performance for both types of firms, with local SOE executives' compensation incentives being the strongest and significantly and negatively related to next-period agency costs. In contrast, executive compensation incentives of public interest SOEs perform weaker, and executive compensation of central SOEs is not significantly correlated with next-period performance, although it is positively correlated with next-period performance. In addition, firm size is negatively correlated with the future performance growth of firms, with larger firm size leading to relatively slower overall performance growth, while debt ratio has a positive relationship with reducing the agency costs of SOEs; at the same time, a wider pay gap has a performance-enhancing effect to some extent and has a positive effect on the mitigation of agency costs.

Table 15: Impact of executive compensation in state-owned enterprises on agency costs in the next period

$ACt+1$	Mixed effects regression analysis				Fixed effects regression analysis			
	Business-type SOEs	Public Benefit SOEs	Central State Enterprises	Local state-owned enterprises	Business-type SOEs	Public Benefit SOEs	Central State Enterprises	Local state-owned enterprises
intercept term	1.7315 (3.25)	1.1006 (2.13)	-1.0563 (-3.98)	-1.2595 (-7.20)	4.5977** (5.79)	2.3751*** (3.05)	2.4328* (0.43)	3.1010*** (13.29)
InPay	-0.3024 (-0.37)	0.0279** (0.73)	0.0895** (4.90)	0.3176*** (2.49)	0.0264* (1.46)	0.0237 (0.31)	0.1058** (2.03)	0.0463*** (2.36)
Size	-0.3016 (-0.82)	-0.0438 (-0.65)	0.0384*** (2.08)	0.0127 (0.38)	-0.5234*** (-4.25)	-0.1540*** (-1.36)	0.0626** (1.18)	-0.1645** (-5.92)
Lev	-0.1872** (-3.51)	0.1714 (2.47)	-0.0843 (-0.62)	0.0126* (1.73)	-0.2577*** (-1.87)	0.0912** (2.38)	-0.2574 (-5.31)	2.565216
Gsh	-2.2607 (-2.11)	-13.8251** (-0.96)	-3.6031 (-1.06)	-7.9157** (-5.62)	-0.6725 (-0.97)	15.2904* (0.58)	-2.9820** (-2.06)	0.4877 (1.53)
Gp	-0.0506** (-2.16)	-0.0405*** (-2.44)	-0.0101 (-1.65)	-0.0202 (-2.05)	-0.0405** (-1.34)	-0.0106** (-1.37)	0.049569	-0.0702 (-0.92)
Area	-0.0112 (-0.28)	0.1315** (2.95)	0.0187 (0.34)	0.1074** (1.38)				
year	control	control	control	control	control	control	control	control
industry	control	control	control	control	control	control	control	control
N	342	393	415	407	663	578	614	589
Adj R2	0.5264	0.3652	0.3475	0.2745				
Within R2					0.2846	0.1846	0.1127	0.1445
F	38.3284	10.626	14.3157	45.6279	7.0437	29.6016	5.6423	17.0693

Note: *Significant at the 0.1 level; **Significant at the 0.05 level; ***Significant at the 0.01 level.

In examining the effect of total executive compensation on future performance, there are several performance assessment indicators, and by analyzing the effect of executive compensation levels on the future performance and agency costs of enterprises, this paper concludes that high levels of executive compensation in SOEs can bring about growth in the next period of enterprise performance as well as a reduction in agency costs, but the unlimited use of increasing executive compensation to obtain growth in enterprise performance is not in line with the principle of cost-effectiveness. Therefore, the intensity of executive compensation incentives is also an issue that SOEs need to take into account when considering the process of performance growth.

5. Conclusions and discussions

Using data from 653 SOEs from 2010-2020, this paper investigates the sensitivity of the incentive effect of SOE executive compensation to firm performance and the impact of SOE executive compensation on firm future performance and agency costs. The results of the study show that: From

the mean value of SOE executive compensation, the executive compensation of all types of SOEs increases year by year, and the total executive compensation of commercial SOEs is greater than that of public welfare SOEs and local SOEs, but lower than that of central SOEs; the executive compensation of central SOEs is significantly higher than that of local SOEs, and the gap between the executive compensation of the four types of SOEs is larger in the first two phases, and the gap gradually narrows from the third term onwards, with the national economy in recent years rapid development, all types of SOEs' competitive advantages have been stimulated, so the gap in executive pay has gradually narrowed, highlighting the institutional nature of distribution according to work. Looking at the various performance indicators of SOEs' executive performance appraisal methods, starting from the mixed ownership reform drafted by the SASAC in 2013 (Phase 2), which is oriented towards achieving SOE functionality, the performance indicators of all types of SOEs have declined to vary degrees and started to pick up from Phase 3, with the reform on the right track. In terms of total annual profits, the central SOEs showed a trend of increasing year by year stage, and in terms of their absolute amounts, the central SOEs were much larger than the local SOEs, and the commercial SOEs were larger than the public welfare SOEs, but in terms of their relative numbers (total profits concerning total assets at the beginning of the period), the average value of the total asset margin of the central SOEs was not higher than that of the local SOEs in all stages. In terms of the return on net assets, it is consistent with the revision of the performance appraisal method for SOE executives. The mean values of commercial SOEs rise in the first and second stages of their tenure and begin to fall in the third stage, while the mean values of public interest SOEs do not change much between years except for 2013. In terms of economic value added, the standard deviation between SOEs is large, which is related to the nature of SOEs and the direction of earnings, with central SOEs' performance jumping significantly in the third stage and being higher than local SOEs in all stages, but the advantage of economic value added of central SOEs over local SOEs is found to be significantly weakened after considering the impact of enterprise size. In terms of capital preservation ratio, central SOEs rose year on year. In terms of total asset turnover ratio, central SOEs are higher than the other three categories in all terms. The comparison of the growth rate of main business income shows that high-growth enterprises are predominant in commercial SOEs, except for public welfare SOEs, commercial SOEs, central SOEs, and local SOEs from the third stage onwards, the rise in executive pay is gradually reduced, there are clear performance appraisal standards as a limit, and the pay incentive mechanism gradually tends to be improved, further fitting in the direction of the development of Chinese SOEs.

In terms of the incentive effects of executive compensation, the approach to executive assessment by public interest SOEs is being revised and improved, and although it is not currently catching up with commercial SOEs, central SOEs, and local SOEs, the level of executive compensation has begun to show positive effects on future performance and agency conflict mitigation. However, in a comparison of executive compensation performance sensitivity, it is found that the current SOE incentive assessment of executive effort ignores the exclusion of industry average performance factors, resulting in a significant lack of significance for performance excluding industry effects, although executive compensation performance sensitivity is significantly positively related to next period performance for commercial SOEs and central SOEs, respectively. Moreover, the executive compensation performance assessment approach does not exclude the impact of monopoly or other political factors on performance incentives from the consideration of executive compensation setting for the four types of SOEs, which may affect the growth of next period performance, or even have a significant negative effect. However, in terms of the effect on mitigating agency costs, incentives for executive compensation in the four types of SOEs are found to contribute significantly not only to lower agency cost reductions but also to the amount of agency cost reductions excluding industry effects. In addition, the pay gap also has a positive effect on reducing agency costs.

To sum up, the evaluation of the effect of executive compensation incentives should combine multiple factors and consider the political and social responsibilities of executives as managers of state-owned enterprises within the scope of their duties. Establish a remuneration incentives mechanism that matches the characteristics of the identity and responsibilities of executives and their performance, and test the effect of executive remuneration incentives with scientific methods and standardized systems. Within the enterprise, the distribution mechanism should be improved to achieve both incentive and restraint, both efficiency and fairness, combined with the nature and characteristics of the enterprise and the law of development, performance-oriented, scientific evaluation of the job contribution and job performance of senior executives of state-owned enterprises, and fair distribution of various salaries of senior executives. At the same time, find the way of selection and appointment in line with the remuneration incentive of senior executives of state-owned enterprises, and apply the results of comprehensive consideration of enterprise functions and enterprise business performance to

the remuneration allocation of senior executives. In the incentive system of the top management of state-owned enterprises, it is clear that the annual basic salary, year-end performance as well as the tenure incentive income to the incentive role of enterprise executives, and also the market definition of the Party Central Committee as well as the State Council and local governments for executives. Under the reform of the economic system of state-owned enterprises, the incentive measures for the selected company management personnel should be decided according to the system of supply and demand of talent value, and the short-term incentive and long-term incentive should be combined in the salary distribution measures, and the market-based distribution system should be implemented to promote the transition of the incentive environment to the market and the steady improvement of incentive benefits. At the same time, we should improve the internal supervision mechanism of enterprises, promote the combination of economic responsibility audit, deferred payment, call for payment, and other restraint mechanisms with the incentive system, and keep the effect of executive compensation incentive of state-owned enterprises in a benign development, to promote the effective exploration of long-term incentive system in the planning of high-quality management talent resources.

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