Executive Internal Compensation, Executive Confidence and Corporate Risk Taking

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Abstract: Researchers in the field of corporate governance has been committed to exploring the causes and effects of internal compensation dispersion. From the perspective of psychology, this paper discusses the effect of the executive internal compensation gap on risk-taking within the enterprise, from the perspective of CEO overconfidence. According to figures from non-financial corporations listed on Shanghai and Shenzhen A-shares from 2010 to 2021, the results of the research are as follows: (1) The internal executive pay gap has a positive impact on the company's level of risk-taking; (2) The large pay gap between CEO and non-CEO executives will cause CEO overconfidence; (3) CEO overconfidence is a path of action that the internal pay gap of senior executives affects enterprise risk-taking; (4) The internal pay gap of senior executives has a positive impact on the level of enterprise risk-taking both in state-owned enterprises and non-state-owned enterprises. The conclusion of this study has certain theoretical and practical significance. From the theoretical level, the introduction of CEO's psychological factors into the mechanism of the effect of the internal executive pay gap on enterprise risk-taking will help to understand the impact of compensation dispersion and enrich the research in this field. From the practical level, the results of this study have bright implications for policymakers and business practitioners.

Keywords: executive internal compensation, CEO overconfidence, enterprise risk-taking

1.   Introduction

1.1. Background

The "sky-high" salary of senior executives often causes public controversy. Researchers are also committed to studying the pay gap in enterprises. According to the previous literature, the definition of salary dispersion can be divided into vertical and horizontal explanations: vertical salary dispersion refers to the salary gap between executives and employees, and horizontal salary dispersion refers to the salary gap among executives, star employees, and ordinary employees. As for the reason, past research often explained it from the championship theory and the equity theory [1]. As for its impact, previous studies generally focused on enterprise performance and enterprise innovation [2]. However, there is relatively little research on enterprise risk-taking. Risk-taking is an important decision in enterprise investment decisions, which can be reflected in both venture investment and R&D innovation. It will help enterprises to increase their future performance and value [3]. The internal pay disparity between senior executives and enterprise risk-taking is the topic of this paper's research.

As for the mechanism of action, the previous literature has included the psychological factors of senior executives in the influence of the compensation gap of senior executives on the innovation of enterprises [4]. Kong Dongmin's research results show that CEO overconfidence has a positive impact on enterprise innovation [5]. Yu Minggui's research also shows that the characteristics of overconfidence make managers increase risk investment, thus improving the level of enterprise risk-taking [6]. This research selects the intermediate variable of executive overconfidence to explore the independent variable's action path over the dependent variable.

1.2. Related Research

1.2.1. Internal salary gap of senior executives.

The compensation of senior executives is an important means to motivate them to improve corporate performance, and executives of different positions and levels are bound to have different compensation levels. According to previous literature, there are often two different theoretical explanations for the economic consequences caused by the differences in executive compensation. According to the championship theory, senior executives will be motivated by high salaries to work hard, thus promoting enterprise innovation and improving enterprise future performance [7.8]. Ridge and other academics have demonstrated that the internal executive pay disparity affects non-CEO turnover rates negatively [9]. The social comparison theory believes that executives with lower salaries will feel unfair to the larger salary difference, thus losing the enthusiasm to cooperate and take risks [10].

1.2.2. Overconfidence.

Hambrick et al. believed that the company's major decisions were easily affected by the CEO's characteristics [11]. Niu Jianbo et al. divided the ways that executives' psychology affects corporate decision-making into executives' self-confidence, entrepreneurship, and internal motivation [4]. Executive motivation refers to arrogance and over-optimism, that is, an upward cognitive deviation between individual subjective knowledge and objective reality [12]. As for the overconfidence of senior executives, there are many kinds of literature pointing out that its advantages and disadvantages coexist. For example, companies with the overconfidence of CEOs have a higher level of diversification, but it will lead to the acquisition of enterprises at a premium [13.14]. In terms of enterprise innovation and risk-taking, overconfident CEOs will underestimate failure probability and are willing to "face difficulties" in order to prove their ability, which often has a positive effect [5.6].

1.3. Research Objective and Framework

1.3.1. Research objective.

Wang Ran's research focuses on the uncertainty of the future cash inflow of enterprises in enterprise risk undertaking, while this paper focuses on R&D investment [2]. Based on the above analysis, will it promote executives to increase R&D investment, so as to improve the risk-bearing level of the enterprise, when appropriately expanding the internal executive pay disparity? If the moderate expansion of the salary gap among senior executives can indeed improve the risk-taking level of enterprises, what is its mechanism? In which situations is it more significant? This article will discuss these issues in depth.

1.3.2. Framework.

This paper first reviews the literature, summarizes the conclusions of previous relevant studies, and then determines the research object. Then data collection and selection of variable measurement methods are carried out with reference to the literature. Afterward, this paper uses Stata to conduct data analysis to verify assumptions, draw conclusions, and explore the limitations of the article.

2. Methodology

2.1. Source of Data

This paper uses figures from non-financial corporations listed on Shanghai and Shenzhen A-shares from 2010 to 2021 as an initial sample. The original data involved in executive compensation, executive characteristics, and corporate finance are all from CSMAR database, which is 30460 in total.

2.2. Data Processing

The data preprocessing methods are as follows: (1) The samples of financial companies are deleted because the capital structure of the financial industry is relatively special. (2) The samples marked with ST and * ST during sample deletion are deleted. The specially treated companies have the risk of delisting, which will affect the company value and cannot represent most companies. (3) The samples whose asset-equity ratio is less than 1 (insolvent) are deleted. Since creditors may file for bankruptcy and corporate governance is in an abnormal state, the author does not consider such samples. (4) The samples with missing or abnormal key variables (such as undisclosed R&D expenses) are deleted. After the processing above, a total of 11966 company-year unbalanced panel data were finally obtained, and Stata was used for data analysis.

2.3. Model Variable Analysis

2.3.1. Dependent variable.

According to previous literature, the indicators used to measure enterprise risk-taking include: (1) Volatility of earnings [3]. (2) Volatility of stock returns [15]. (3) R&D expenditure [15]. This research uses the ratio of enterprise R&D expenditure to the total assets of the current year to measure the level of risk-taking of enterprises. The Formula (1) is as follows.

$$Risk = \frac{R\&D}{ASSET} \tag{1}$$

2.3.2. Independent variable.

At present, the research on the internal executive pay disparity mainly adopts two measurement methods: (1) divide senior executives into CEO and non-CEO and measure the discrepancy between the two parts of the compensation (2) classify compensation from top to bottom and use the difference between compensation for the first three executives and other executives [4]. In this paper, the first method is adopted. GAP represents the compensation gap between senior executives, $SALARY_{CEO}$ represents CEO compensation, $SALARY_{NCEO}$ represents the average compensation of non-CEO executives, and $ASSET$ represents the total assets of the enterprise. The Formula (2) is as follows.

$$GAP = \ln\left(\frac{SALARY_{CEO}}{ASSET} - \frac{SALARY_{NCEO}}{ASSET}\right) \tag{2}$$

2.3.3. Intermediary variable.

Referring to relevant literature, this paper uses the personal characteristics of the general manager as a substitute variable for CEO' overconfidence [6]. The personal characteristics concerned include: (1) Gender. The dummy variable G is constructed. For a male CEO, the value is 1, and for a female CEO, the value is 0. (2) Age. Construct dummy variable A, when the CEO's age is greater than or equal to the average age of the sample, the value is 1, and vice versa, the value is 0. (3) Education level. Construct the dummy variable C, when the CEO's degree is undergraduate or above, the value is 1, otherwise it is 0. (4) Professional background. The dummy variable M is constructed. If the CEO's specialty has nothing to do with economic management, the value is 1, otherwise it is 0. (5) Two functions are combined. If the CEO is also the chairman, the value is 1, otherwise it is 0.

Next, this paper further constructs comprehensive variables OC-add the values above. If the total number is greater than or equal to 4, it is considered overconfidence and X is assigned as 1, otherwise it is 0.

2.3.4. Controlled variable.

The control variables used in this model are presented in Table (1).

Table 1: Controlled variables' definition.

Variable names	Variable symbols	Variable declarations
Controlled-shareholder Proportion	ContrshrProportion	Holding ratio of the controlled shareholder
Board Size	Boardsize	Number of directors
Proportion of independent directors	Idr	The number of independent directors/The number of directors
Rate of return on total assets	ROA	Net profit/Total assets
Debt level	Lev	Total liabilities/Total assets

2.4. Machine Learning Models

This research develops a model below to examine the effect of senior executives' internal salary discrepancies on the taking of corporate risks.

$$Risk = \gamma_0 + \gamma_1 GAP + \gamma_2 X + \mu \tag{3}$$

X is the vector composed of all control variables and μ is the disturbance term.

2.5. Hypothesis

According to the research conclusion of the internal salary gap and innovation of enterprises - the championship theory plays a leading role in innovation activities, this paper assumes that the senior executives' internal salary discrepancy is positively affecting the enterprise's risk-taking according to the championship theory.

Hayward et al. found that the three factors that affect the confidence of executives are their recent success, external praise, and sense of self-importance [16]. First of all, part of CEO compensation is the result of its short-term performance, which is a criterion to prove the recent success of CEO.

Secondly, the large internal salary gap is the board's affirmation of the CEO's past achievements and expectations for his future work. They not only praise the CEO's workability but also give him important tasks, which improves the CEO's confidence. Clearly, the salary gap can increase the confidence of CEOs who have received high salaries.

The study found that managers with overconfidence characteristics more identify with their leadership ability and actively make high-risk and high-return investments, thus increasing the level of risk-taking of enterprises [6]. Based on this, the author speculates that overconfident CEOs will make more decisions on technological innovation activities, increase the R&D expenditure, and thus increase the level of risk-bearing of enterprises. Enterprise innovation is high-risk and high-return, but overconfident CEOs have a higher evaluation of themselves and their teams, are more optimistic about the expected results, and pay more attention to achievements, so they are more inclined to make decisions about enterprise innovation.

Based on the above analysis, the following assumptions are proposed.

Hypothesis 1: The greater the internal salary gap between senior executives, the higher the level of enterprise risk-taking.

Hypothesis 2: The executive salary gap impacts enterprise risk-taking by making executives overconfident.

In this model, if γ_1 in Formula (2) is significantly positive, hypothesis 1 can be verified.

3. Results and Discussion

3.1. Data Visualization

Table 2 shows the descriptive statistical outcomes of independent, control and intermediate variables. From the results of all samples, the average value of the independent variable GAP set by the author is -6.930, and the standard deviation is 1.480. The average of the composite variable OC is 0.460, with a median of 0, indicating that the proportion of overconfident CEOs is less than half.

Table 2: Data visualization.

Variable	N	Mean	SD	Min	Max	p50
rd	11966	2.400	2.240	0	39.02	1.990
GAP	11966	-6.930	1.480	-16.58	-1.680	-6.800
ContrshrProportion	11772	38.76	15.25	0.160	155.2	37.61
Boardsize	11965	8.440	1.670	0	17	9
IndDirectorRatio	11964	37.63	5.450	14.29	80	36.36
ROA	11967	3.030	14.78	-494.6	744.6	4.100
Lev	11966	0.410	0.240	0.0100	10.50	0.400
OC	11965	0.460	0.500	0	1	0

3.2. Regression Analysis

Table 3 illustrates the regression test results of GAP and Risk. From column (1) to column (6), each column represents a model, and the corresponding factors with numerical values are included in the model. Among them, the coefficient of the holding ratio of the controlled shareholder and the return on assets is positive, indicating that the higher the shareholding ratio of the controlling shareholders, the greater the return on investment, and the greater the level of risk-taking of the enterprise. The size of the board of directors and the proportion of independent directors are negatively correlated with

the company's risk-taking level, indicating that the smaller the number of directors and independent directors, the higher the level of enterprise risk-taking. This is in line with reality.

It is illustruted from Table 3 that the coefficient of the independent variable has been greater than 0 and is significant at the level of 1%, which indicates that CEOs with a larger salary gap with other senior executives inject more investment in research and development when making corporate decisions. The investment strategy is more active and does not show the characteristics of risk avoidance. In other words, the internal compensation dispersion of senior executives plays an important role in upgrading the level of risk-taking of enterprises, which supports hypothesis 1 of this paper.

Table 3: Regression analysis.

	(1)	(2)	(3)	(4)	(5)	(6)
Variable	rd	rd	rd	rd	rd	rd
GAP	0.341***	0.336***	0.334***	0.334***	0.334***	0.297***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.017)
ContrshrProportion		0.003**	0.003**	0.004**	0.003**	0.003**
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Boardsize			-0.063***	-0.087***	-0.086***	-0.083***
			(0.011)	(0.014)	(0.014)	(0.014)
IndDirectorRatio				-0.013***	-0.013***	-0.013***
				(0.004)	(0.004)	(0.004)
ROA					0.007***	0.003
					(0.003)	(0.002)
Lev						-0.716***
						(0.183)
Constant	4.760***	4.590***	5.118***	5.804***	5.788***	5.813***
	(0.095)	(0.108)	(0.137)	(0.269)	(0.269)	(0.268)
Observations	11,966	11,772	11,771	11,770	11,770	11,770
R-squared	0.051	0.050	0.052	0.053	0.055	0.060

3.3. Mediation Effect Analysis

The previous part demonstrated that there is a significant positive correlation between the internal executive salary disparity and enterprise risk-taking level. Then this paper continues to verify hypothesis 2. The author uses the "three-step" method to test the intermediary effect of "executive overconfidence". The results are shown in Table 4. It can be seen from column (1) that the coefficients of GAP and OC are 0.025, which is a positive sign. It indicates that the pay gap between CEO and non-CEO executives will cause CEO overconfidence. Then, the independent variable and the intermediary variable are included in one model for regression. It can be seen from column (2) that the independent variable still has a significant positive correlation with the dependent variable, and the coefficient is smaller than the result in table 3. This can prove the role of the intermediary variable of the overconfidence of executives, that is, hypothesis 2.

Table 4: Mediation effect analysis.

Variable	(1) OC	(2) rd
GAP	0.025***	0.294***
	(0.003)	(0.017)
OC		0.092**
		(0.040)
ContrshrProportion	0.000	0.003**
	(0.000)	(0.001)
Boardsize	-0.006*	-0.083***
	(0.003)	(0.014)
IndDirectorRatio	0.001	-0.013***
	(0.001)	(0.004)
ROA	0.000	0.003
	(0.000)	(0.002)
Lev	-0.034*	-0.712***
	(0.019)	(0.184)
Constant	0.652***	5.752***
	(0.061)	(0.268)
Observations	11,769	11,769
R-squared	0.008	0.060

3.4. Robust Test

In order to enhance the reliability of the research conclusion, this paper uses the method of changing the sample size for the robustness test. In this paper, a 1% tail reduction adjustment is applied to the continuous variables to eliminate the impact of extreme values. It can be seen from Table 5 that the independent variable is still significantly positively correlated with the dependent variable, and the empirical results are still consistent with the previous results.

Table 5: Robust test.

Variable	(1) rd
GAP	0.284***
	(0.014)
ContrshrProportion	0.002
	(0.001)
Boardsize	-0.087***
	(0.013)
IndDirectorRatio	-0.014***
	(0.004)
ROA	0.015***
	(0.003)
Lev	-0.870***
	(0.113)
Constant	5.820***
	(0.247)
Observations	11,770
R-squared	0.076

3.5. Heterogeneity Analysis

Executives' decisions will be affected by different property rights under China's unique system. Therefore, the author distinguishes state-owned and non-state-owned enterprises and conducts a heterogeneity test. According to Table 6, the coefficients of independent variables in state-owned enterprises and non-state-owned enterprises both show a significant positive correlation.

Table 6: Heterogeneity analysis.

Variable	(1) SOE	(2) NSOE
GAP	0.301***	0.263***
	(0.026)	(0.018)
ContrshrProportion	0.008***	0.002
	(0.002)	(0.002)
Boardsize	-0.031	-0.056**
	(0.020)	(0.022)
IndDirectorRatio	-0.019***	-0.006
	(0.006)	(0.006)
ROA	0.003	0.002
	(0.004)	(0.002)
Lev	-0.026	-1.267***
	(0.183)	(0.138)
Constant	4.840***	5.431***
	(0.407)	(0.426)
Observations	3,156	8,614
R-squared	0.061	0.055

3.6. Limitation

This study has the following limitations: (1) The information disclosure of R&D expenses of some listed companies is not comprehensive, so the enterprise R&D expenses lack much data. After deleting the samples with missing variables, the sample size decreased significantly. (2) When measuring the intermediate variable of overconfidence of senior executives, this paper uses personal characteristics to construct a comprehensive variable to measure. However, there are deviations between the final decision-making behavior and personal characteristics of senior executives, and this measurement method may need to be further improved. If researchers can better overcome the difficulties of process measurement methods, the accuracy of measurement will be improved. In addition, multiple measurement methods should be used comprehensively, including verbal response, behavioral response, and macro-economic index, to capture different aspects of overconfidence and improve accuracy [12].

4. Conclusion

According to figures from non-financial corporations listed on Shanghai and Shenzhen A-shares from 2010 to 2021, the results of the research are as follows: (1) The internal executive pay gap has a positive impact on the company's level of risk-taking; (2) The large pay gap between CEO and non-CEO executives will cause CEO overconfidence; (3) CEO overconfidence is a path of action that the internal pay gap of senior executives affects enterprise risk-taking; (4) The internal pay gap of senior

executives has a positive impact on the level of enterprise risk-taking both in state-owned enterprises and non-state-owned enterprises.

The conclusion of this study has certain theoretical and practical significance. From the theoretical level, the introduction of CEO's psychological factors into the mechanism of the effect of the internal executive salary gap on the risk-taking of enterprises will help to understand the impact of compensation dispersion and enrich the research in this field. From the practical level, the results of this study have bright implications for policymakers and business practitioners. First of all, the salary makers of enterprises can improve the CEO's salary and encourage the willingness of executives to take risks, thus promoting the technological innovation of enterprises and improving the competitive advantage of enterprises. Second, overconfident CEOs have a positive effect on investment in research and development. Enterprises should properly cultivate the overconfidence of the CEO through the adjustment of the internal salary distribution of senior executives according to their actual situation and the stage of their life cycle.

The limitation of this paper is that the data disclosure of research and development expenses is not much, and the measurement method of intermediary variables is single. It is hoped that more sufficient data can be obtained in the future, and multiple methods to measure the overconfidence of executives can be comprehensively used to make the research more accurate.

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