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Weakening Effect of Executive Overconfidence on Equity Incentive—The Empirical Evidence from Chinese Listed Companies

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Abstract

The paper takes Chinese listed companies from 2010 to 2016 as samples, to examine the relationship between executive overconfidence and equity incentive. Results show that executive overconfidence has a significant weakening effect on equity compensation incentives (including stock options and restricted stocks), that is, compared with rational executives, the company will reduce the equity incentives for overconfident executives.

Keywords

Executive Overconfidence, Equity Incentives, Risk

1. Introduction

In modern enterprises where ownership and control are separated, due to the inconsistency of the utility function and information asymmetry, there is inevitably a proxy conflict between the principal (shareholder) and the agent (the executive). Fama (1980) [1] believed that risk-taking and management are two independent production factors owned by the principal and the agent respectively. The difference between the two parties' risk claims is the embodiment of the agency conflict. Equity compensation has received extensive attention as an effective means for shareholders to motivate executives to take risks and mitigate agency conflicts (Jensen and Meckling, 1976) [2]. The incentive effect of equity compensation has also been verified by many scholars (Li Xiaorong, 2014; Kim, 2017) [3] [4]. Therefore, under the traditional optimal compensation contract theory framework, the company can adjust the risk-taking level of senior executives through equity compensation, and achieve a balance between profit sharing and risk-taking, and encourage executives to make decisions about maximizing

shareholder value.

However, the "rational person" as the premise of the traditional optimal salary contract theory is not fully satisfied under realistic conditions. Roll (1986) [5] found that entrepreneurs generally have the irrational character of overconfidence. Overconfident executives overestimate their own ability, thus overestimating the probability of successful of investment projects, and therefore deviate from the decision-making under rational conditions. Compared with rational executives, over-confident executives are more inclined to invest in risky projects. So it raises the risk of the enterprise unconsciously. Malmendier and Tate (2005) [6] provided empirical evidence, which confirms that in the case of ample cash flow, executives will over-invest in the prospect of overestimating the project. Goel and Thakor (2008) [7], in their theoretical derivation of its CEO selection model, found that the overconfidence of executives would inhibit the underinvestment caused by risk aversion. This view was obtained by Campbell (2011) [8]. Because equity compensation and overconfidence can influence or motivate executives' risk-taking, it can be expected that companies will adjust their compensation contracts in a timely manner according to the degree of overconfidence of executives so that executives' risk-taking levels are optimal (Gervais, Heaton and Odean, 2011) [9].

2. Hypothesis

Shareholders in modern enterprises can diversify the company's non-systematic risks through diversified investments in the capital market, and thus have the characteristics of risk neutrality and even risk hobbies. However, it is risk aversion for executives whose personal wealth and human resources are closely related to the companies they serve and cannot achieve diversified investments. The inconsistency between the two parties' risk appetites causes executives to act against the goal of maximizing shareholder value. This is a typical principal-agent problem that is common in modern enterprises.

According to the optimal contract theory, the shareholders or the board of directors who are faithful representatives of their interests can solve the agency problem by designing an effective executive compensation contract. The equity compensation is highly praised and widely application because it can link the interests of shareholders and executives closely (Jensen and Meckling, 1976) [2]. Scholars also confirmed the positive role of equity compensation contracts in solving risk agency problems through multiple variables such as the value, quantity or proportion of equity compensation (such as stock options and restricted stocks). For example, equity compensation can encourage executives to expand investment scale. To improve investment levels (Lu chuang, 2015) [10], for more risky R & D investments (Sanders and Hambrick, 2007) [11], a more radical debt policy is adopted (Mehran, 1992) [12], to improve the overall risk level of the company. However, these studies have not profoundly revealed the mechanism of action of equity compensation. Jensen (1990) [13] take the lead in using

pay-performance sensitivities to measure the incentive intensity of compensation, Core and Guay (2002) [14]. Inspired by Jensen, Delta (equity pay-price sensitivity) and Vega (equity pay-gain volatility sensitivity) based on the BS valuation model are used to measure the incentive intensity of equity compensation. The former reflects the synergy effect of equity compensation, while the latter can be used to explain the effect mechanism of equity compensation on risk exposure. Empirical results show that higher Vega can motivate executives to choose riskier R & D investments (Gormley *et al.*, 2013) [15], and M & A investment (Hagendorff, 2011) [16], and even over-investment (Shen and Zhang, 2013) [17], leading to higher business concentration (Coles *et al.*, 2006) [18], and less use of hedging transactions in derivative securities to hedge risk (Bakke, 2016) [19]. Eventually, the overall risk level of the company will rise (Wang Dong, 2016) [20]. Chen *et al.* (2014) [21], it is further found that Vega usually increases the total risk of the enterprise through systemic risk, because increasing the system risk will lead to greater value of the CEO's equity compensation.

With the rise of behavioral finance, the "rational man" hypothesis of the traditional principal-agent model was relaxed. The objective existence of irrational factors of overconfidence and its impact on executive risk exposure have also been confirmed. In fact, companies with overconfident executives have more R & D investment (Hirshleifer, 2012) [22], and low-performing mergers and acquisitions (Malmendier and Tate, 2008) [23], a more radical debt policy (Landier, 2008; Malmendier and Tate, 2011) [24] [25], higher total investment level (Jiang Fuxiu, 2009) [26], and the overall risk level of the company (Yu Minggui, 2013) [27]. Because overconfident executives overestimate their ability and the extent to which they control risk, they underestimate the risks of the project or the company and unconsciously assume too much risk. The overconfidence characteristics of executives are bound to affect the expected effect of the "optimal pay contract" under the assumption of "rational people", leading executives to make excessive risk-taking decisions with serious consequences (such as over-investment). Therefore, it is necessary for the company to re-adjust the compensation contract to the optimal level based on the degree of overconfidence of executives to encourage executives to make optimal decisions.

Gervais, Heaton and Odean (2011) [9] in the capital budget model, both the compensation contract and overconfidence are considered, and the interaction between the two is theoretically studied. In their model, companies hire executives to make investment decisions on behalf of companies, and risk aversion will allow executives to abandon some risky projects with positive net present value. To overcome this phenomenon, companies will provide convex pay to increase the level of risk taking, if the executives are overconfident, the situation changes, because the overconfidence of executives can offset the negative effects of risk aversion to some extent. In other words, be relative to rational executives, less equity compensation (convex compensation) is enough to motivate overconfident executives to assume established risks. Excessive equity compensation

can make overconfident executives make risky decisions. Based on the above analysis, we propose the following assumptions:

Hypothesis: Executive overconfidence has a significant weakening effect on equity compensation incentives, that is, companies will reduce incentives for over-confident executives' equity compensation compared to rational executives.

3. Research Design

3.1. Variable Definition

As mentioned above, foreign scholars usually measure the incentive intensity of equity compensation based on the vega and the slope of the salary-performance relationship. However, since the equity incentive system in China started late, the correlation between Vega and Delta is calculated. The data is difficult to obtain, so domestic scholars mostly use the value of equity compensation or the proportion of equity incentives to the total share capital as the proxy variable of the incentive intensity of equity compensation (Xiao Shufang, 2013) [28]. This article refers to Bergstresser & Philippon (2006)'s [29] simple method is to use the following formula to calculate the incentive intensity of equity compensation (that is, the percentage change of the equity compensation value as a percentage of the total salary change of the senior executives in each year when the company's stock price changes by 1%):

$$\text{Incentive}_{i,t} = \frac{0.01 * \text{Price}_{i,t} * \left(\text{Rstock}_{i,t} + \text{Options}_{i,t}\right)}{0.01 * \text{Price}_{i,t} * \left(\text{Rstock}_{i,t} + \text{Options}_{i,t}\right) + \text{CashComp}_{i,t}} \quad (1)$$

among them, $\text{Price}_{i,t}$ For the closing price of the stock of i company at the end of the year, $\text{Rstock}_{i,t}$ with $\text{Options}_{i,t}$ The number of restricted stocks and stock options held by i company executives at the end of the year, $\text{CashComp}_{i,t}$ The total amount of cash compensation earned by i company executives that year.

Despite the prevalence of executive overconfidence, the measure of overconfidence is very difficult. The more commonly used method is the stock option method (Humphery-Jenner, 2016) [30], corporate mergers and acquisitions law (Doukas, 2007) [31], mainstream media evaluation method (Malmendier & Tate, 2005) [6], and executive shareholding change law (Liang Shangkun, 2015) [32], and Executive Personal Characteristics Law (Yu Minggui, 2013) [27]. Considering the institutional background of China's capital market and the availability of data, we refer to Chen Su (2014) [33]. Use corporate annual earnings forecasts to measure executive overconfidence. In view of the fact that the performance forecasting system of listed companies in China has been introduced since 1998, after many revisions and improvements, the data is sufficient and reliable. We regard the company's senior executives' forecasted profitability in the current year as the actual profit level as an optimistic forecast. In 2010-2016, if more than 50% of the forecasts are optimistic, we believe that the company's executives are overconfident in all years.

In addition to the above explanatory variables, we also control other factors

that are considered important in the existing compensation literature. At the executive level, we control the average age and tenure of executives. At the company level, we control the separation of roles, corporate growth, R & D intensity, return on assets, market-to-book ratio, stock return, company market value, corporate age, fixed assets, financial leverage, property rights and equity concentration. Table 1 describes the variables used in this article in detail.

3.2. Model Construction

To validate the hypothesis, this paper draws on Humphery-Jenner (2016) and builds a multiple regression model as needed:

$$\begin{aligned}\text{Incentive} = {} & \beta_0 + \beta_1 \text{OC} + \beta_2 \text{Separation} + \beta_3 \text{Research} + \beta_4 \text{ROA} + \beta_5 \text{Return} \\ & + \beta_6 \text{Value} + \beta_7 \text{Fixassent} + \beta_8 \text{PB} + \beta_9 \text{Lev} + \beta_{10} \text{Firmage} + \beta_{11} \text{Growth} \\ & + \beta_{12} \text{State} + \beta_{13} \text{COCEN} + \beta_{14} \text{Age} + \beta_{15} \text{Tenure} + \sum \text{Industry} + \sum \text{Year} + \varepsilon\end{aligned} \quad (2)$$

The variables involved are shown in Table 1. The model also controls the fixed effect of the industry and the fixed effect of the year.

3.3. Sample Selection and Data Sources

This paper takes the senior management team of China's A-share listed companies from 2010 to 2016 as the research object. The senior management team is

Table 1. Variable definition table.

Variable nature	Variable name	Variable symbol	Variable definitions
Explained variable	Equity compensation incentive	Incentive	See formula (1)
Explanatory variables	Executive overconfidence	OC	Profit forecasting method
Company level Control variable	Separation of two posts	Separation	Take 1 when the chairman and general manager are not the same person, otherwise take 0
	Growth	Growth	(Main income of the current period − main income of the previous period)/main income of the previous period
	R & D intensity	Research	R & D expenses/main business income
	Return on total assets	ROA	Return on total assets, total profit/total assets
	Market ratio	PB	Total market value/net assets
	Stock return	Return	Annual return on individual stocks
	Company market value	Value	Natural logarithm of the company's market capitalization
	Company age	Firm age	Number of years from the company's listing to the statistical deadline
	Fixed assets	Fixasset	The natural logarithm of the company's fixed assets
	Financial leverage	Lev	Asset-liability ratio, total liabilities/total assets
	Nature of property	State	The value is 1 when the company is a central/local state-owned enterprise, otherwise it is 0.
	Equity concentration	COCEN	Proportion of the top ten shareholders of the company
Executive level Control variable	Average age of executives	Age	Average age of all senior managers
	Executive average term	Tenure	Average term of all senior management

the company's manager, deputy manager, financial controller, board secretary of the listed company and other senior management personnel as stipulated in the company's articles of association. The relevant data on equity compensation (that is, the number of stock options and restricted stock held by company executives at the end of the year) was collected manually from the announcement of the company's relevant equity incentives. Other data were obtained from the wind database and the Guotaian database. In order to ensure the accuracy and effectiveness of the data, the following screening process is adopted: 1) Excluding companies that have not disclosed their performance announcements or performance forecasts in the following year; 2) Excluding companies that are ST, PT and delisted; 3) Excluding Financial listed companies; 4) Excluding companies with large changes in executives; 5) Excluding companies with abnormal data; 6) Ending observations outside the 1% quantile of all consecutive variables deal with. In the end, 1686 listed companies received a total of 9979 annual observations for 7 years. In this paper, descriptive statistics and multiple regression analysis of data are carried out by Stata.

4. Empirical Results

4.1. Descriptive Statistics and Related Analysis

Table 2 gives descriptive statistical characteristics of each variable under the full sample, and the mean and difference analysis of each variable in the two subsamples of rational executives and overconfident executives. Among them, 816

Table 2. Descriptive statistics and group mean difference T test table of main variables.

	Whole sample				Rationality (OC = 0) (1)	Overconfidence (OC = 1) (2)	Difference (3) = (1) − (2)
	Max	Min	STD	Mean			
Incentive	8.347	0	1.685	0.507	0.537	0.356	0.181***
separation	1.000	0	0.443	0.731	0.7410	0.619	0.122***
Research	25.300	0	4.077	3.921	3.952	3.616	0.337**
Growth	234.300	−100.000	40.830	16.686	16.892	14.376	2.517*
ROA	23.250	−22.460	6.383	3.795	4.034	1.117	2.917***
PB	51.060	−1.246	6.438	5.016	5.038	4.766	0.272
Return	15.210	−0.838	0.633	0.218	0.218	0.211	0.007
Value	19.110	9.398	0.944	13.226	13.248	12.979	0.269***
Firm age	26.050	0.997	6.227	9.3983	9.692	6.105	3.586***
Fixasset	18.040	−2.013	1.739	10.772	10.773	10.769	0.004
Lev	102.800	4.635	22.460	43.958	43.829	45.412	−1.583*
State	1.000	0	0.473	0.337	0.355	0.136	0.219***
COCEN	98.550	1.320	15.670	57.416	57.394	57.668	−0.275
Age	60.630	32.330	3.611	46.417	46.493	45.569	0.924***
Tenure	8.743	−0.266	1.842	3.419	3.428	3.317	0.111*

Note: *p < 0.1, **p < 0.05, ***p < 0.01 (two-tailed test).

observations of overconfidence of executives accounted for 8.2% of the total sample. It can be seen that the average value of equity compensation incentive intensity is only 0.51%, the minimum value is 0, the maximum value is 8.35%, and there are significant differences between the two subsamples. Rational executives have greater equity compensation incentive intensity than overconfident executives. This is consistent with our motivational assumptions. In addition, it can be found that, compared with overconfident executives, companies with rational executives have more R & D investment, higher growth, higher profitability, larger enterprise scale, and smaller financial leverage; Executives in state-owned enterprises are relatively more rational.

Before the empirical analysis, the Pearson correlation analysis is used to test whether there is a multi-collinearity problem in the model. The results are shown in Table 3. Except that the correlation coefficient between R & D expenses and asset-liability ratio is −0.338, the correlation coefficient of other variables does not exceed 0.3, indicating that there is no multi-collinearity problem in the model.

4.2. Analysis of Empirical Results

The model (2) is tested by full-sample regression. Table 4 gives the results of the

Table 3. Pearson Coefficient Matrix Table among Variables.

	Incentive	OC	Research	ROA	Return	Value	Fixasset	PB	lev	Firm age	Growth	State	COCEN Separation	Age
Incentive	1.000													
OC	−0.040***	1.000												
Research	0.092***	−0.051***	1.000											
ROA	0.110***	−0.112***	0.039***	1.000										
Return	0.111***	−0.023**	0.051***	0.077***	1.000									
Value	0.100***	−0.004	0.010	0.255***	0.220***	1.000								
Fixasset	−0.027***	0.034***	−0.283***	−0.046***	−0.092***	0.472***	1.000							

Continued

PB	0.003	−0.015	0.054***	−0.024**	0.280***	0.025**	−0.306***	1.000							
lev	−0.075***	0.098***	−0.338***	−0.382***	−0.031***	0.027***	0.245***	0.137***	1.000						
Firm age	−0.124***	0.097***	−0.214***	−0.187***	−0.021**	0.114***	0.084***	0.147***	0.396***	1.000					
Growth	0.098***	−0.034***	−0.007	0.256***	0.080***	0.107***	−0.088***	0.055***	0	−0.081***	1.000				
State	−0.192***	0.046***	−0.175***	−0.129***	−0.108***	0.111***	0.296***	−0.058***	0.304***	0.415***	−0.103***	1.000			
COCEN	0.036***	−0.043***	−0.012	0.243***	0.030***	0.239***	0.124***	−0.133***	−0.174***	−0.383***	0.078***	−0.046***	1.000		
Separation	−0.042***	0.003	−0.120***	−0.059***	−0.050***	0.039***	0.117***	−0.021**	0.140***	0.204***	−0.033***	0.262***	−0.041***	1.000	
Age	−0.081***	0.004	−0.121***	−0.061***	−0.018*	0.186***	0.288***	−0.035***	0.121***	0.214***	−0.117***	0.303***	−0.020**	0.059***	1.000
Tenure	0.048***	−0.050***	0.059***	−0.025**	0.123***	0.143***	0.140***	−0.041***	−0.051***	0.107***	−0.112***	0.011	−0.081***	−0.052***	0.310***

Note: *p < 0.1, **p < 0.05, ***p < 0.01 (two-tailed test).

Table 4. Regression results.

	(1) Incentive	(2) Incentive	(3) Incentive
OC	−0.151**	−0.225***	−0.234***
	(−2.46)	(−3.13)	(−3.26)
Separation		0.107**	0.107**
		(2.32)	(2.31)
Research		0.028***	0.028***
		(4.83)	(4.70)
ROA		0.019***	0.019***
		(4.46)	(4.37)
Return		0.148***	0.147***
		(3.61)	(3.58)

Continued

Value		0.202***	0.206***
		(5.61)	(5.70)
Fixasset		−0.070***	−0.065***
		(−3.15)	(−2.90)
PB		−0.012**	−0.012**
		(−2.49)	(−2.44)
Lev		0.007***	0.007***
		(5.26)	(5.29)
Firm age		−0.015***	−0.014***
		(−3.17)	(−3.04)
Growth		0.004***	0.003***
		(5.96)	(5.78)
State		−0.690***	−0.656***
		(−12.61)	(−11.74)
COCEN		−0.003*	−0.003*
		(−1.92)	(−1.74)
Age	−0.047***		−0.022***
	(−9.48)		(−3.48)
Tenure	0.019*		0.026*
	(1.68)		(1.88)
cons	2.285***	−1.551***	−0.707
	(8.73)	(−3.82)	(−1.48)
Industry/Annual Fixed Effect	Yes	Yes	Yes
N	9977	7962	7961
Adjust-R2	0.031	0.081	0.082

Note: *p < 0.1, **p < 0.05, ***p < 0.01 (two-tailed test).

regression. The first (1) column is the regression result when the characteristic variables at the senior management level are controlled, and the second (2) column is used to control the company-level characteristic variables. As a result, item (3) is the result of controlling both the executive level and the company level characteristic variables. In addition to the control variables, this paper also controls the annual fixed effect and the industry fixed effect.

The regression results show that the coefficient of executive overconfidence (OC) is always negative (−0.234) and significant at the 1% level. This result shows that over-confident executives receive lower-intensity equity compensation than rational executives, which is consistent with our assumptions. That is, relative to rational executives, less equity compensation (convex compensation) is enough to motivate overconfident executives to take risk. Excessive equity

compensation can make overconfident executives make risky decisions, which is damaged to shareholder value.

The results related to the control variables are also consistent with the existing literature. The size of the company (coefficient of Value is 0.206), the term of the executives (coefficient of Tenure is 0.026) and the incentive intensity of the equity compensation are positively correlated. The age of the company (coefficient of Firm age is −0.014) and the age of the executives (coefficient of Age is −0.022) are negatively correlated with the incentive intensity of the equity compensation, profitability. Companies with higher (coefficient of Return is 0.147 and coefficient of ROA is 0.019) are more likely to use equity compensation, and the greater the company's risk (coefficient of Research is 0.028, coefficient of lev is 0.007, and coefficient of Growth is 0.003), the more equity compensation is needed to attract executives, and the results also indicate shareholders. Supervision (coefficient of COCEN is −0.003) and equity incentives can be substituted for each other. In addition, non-state-owned enterprises have higher incentives for equity compensation (coefficient of Separation is 0.107).

4.3. Robustness Test

To further verify the correctness of the hypothesis, the author also used multiple methods to test the robustness of the regression results.

4.3.1. Alternative Variable Method

We construct the equity compensation incentive dummy variable (Incentive_dum) instead of the equity compensation incentive strength variable. When the company implements the equity incentive for the executive, Incentive_dum takes 1; otherwise, it takes 0. The dummy variable is replaced by the equity compensation incentive intensity variable to perform logit regression on the above model to test whether the result is robust. The results are shown in column (1) of Table 5. The prediction accuracy of the model is above 80%, the model is set well, and the sign and significance of all explanatory variables and control variables have not changed substantially, OC The coefficient of the variable is still significantly negative at the 1% level.

4.3.2. Robust Standard Error and Generalized Least Squares Method

When we performed the White test, we found that the model has heteroscedasticity. Therefore, the model was modified by White's robust standard error. The results are shown in column (2) of Table 5. There is no qualitative change in the coefficient, and the coefficient of the key variable OC is still significantly negative.

In order to further eliminate the effects of heteroscedasticity and model error setting on the results, the regression coefficients are more effective. Glesjer's test is used to determine the possible heteroscedastic form, and the hypothesis model is re-estimated by generalized least squares (FGLS). The results are shown in Table 3 (3). It can be found that the absolute value of the coefficient of OC increases and is still significantly negative.

Table 5. Robustness test regression results.

	(1) Incentive_dum	(2) Incentive	(3) Incentive
OC	−0.529***	−0.234***	−0.263***
	(−4.13)	(−3.47)	(−28.43)
Separation	−0.081	0.107**	0.111***
	(−1.16)	(2.16)	(20.36)
Research	0.059***	0.026***	0.025***
	(6.95)	(3.88)	(38.05)
ROA	0.060***	0.019***	0.019***
	(7.72)	(4.23)	(44.16)
Return	0.006	0.147***	0.070***
	(0.09)	(2.74)	(13.80)
Value	0.417***	0.206***	0.218***
	(6.65)	(5.64)	(58.95)
Fixasset	−0.082**	−0.065***	−0.067***
	(−2.16)	(−2.89)	(−31.15)
PB	−0.065***	−0.012***	−0.012***
	(−4.99)	(−3.10)	(−30.79)
Lev	0.013***	0.007***	0.007***
	(5.55)	(5.52)	(52.23)
Firm age	−0.045***	−0.014***	−0.014***
	(−5.38)	(−3.34)	(−30.44)
Growth	0.002***	0.003***	0.003***
	(2.63)	(4.61)	(40.14)
State	−2.251***	−0.656***	−0.617***
	(−14.79)	(−14.50)	(−92.32)
COCEN	−0.010***	−0.003*	−0.003***
	(−3.66)	(−1.82)	(−20.76)
Age	−0.044***	−0.022***	−0.026***
	(−4.23)	(−3.24)	(−33.54)
Tenure	0.030	0.026*	0.016***
	(1.35)	(1.78)	(9.86)
cons	−5.275***	−0.707	−0.747***
	(−6.13)	(−1.58)	(−11.29)
Industry/Annual Fixed Effect	Yes	Yes	Yes
N	7940	7961	7961
R2	0.187	-	-
Count R2	83.12%	0.082	0.979

Note: *p < 0.1, **p < 0.05, ***p < 0.01 (two-tailed test).

4.3.3. Sample Selection Bias

There may be sample selection bias in measuring earnings overconfidence using earnings forecasts. That is to say, when there is at least one annual profit forecast between 2010 and 2016, the variable can be constructed. However, China's profit forecast system is semi-mandatory, and executives have the space to choose whether to publish profit forecasts. Executives provide earnings forecasts and executive compensation, so the previous analysis may have sample selection bias. To solve the biased estimates caused by sample selection bias, we estimated a Heckman two-stage model.

Table 6 gives the results of the Heckman two-stage model. Column (1) is the result of the first stage of probit regression. The sample selection is modeled. The total sample is all A-share listed companies. The dependent variable (Insample) is the dummy variable of whether the company releases at least one profit forecast. It determines whether the company is included in the above empirical analysis sample, in addition to the enterprise characteristics and executive characteristics mentioned above, it also increases the earnings per share (EPS) as an additional control variable, and finally controls the year fixed effect and industry fixed effect.

Table 6. Heckman two-stage model regression results.

	(1) In sample	(2) Incentive	(3) Incentive_dum
OC		−0.185***	−0.502***
		(−2.59)	(−3.91)
Separation	0.064**	0.222***	0.058
	(2.14)	(4.76)	(0.80)
Research	−0.489	0.020***	0.049***
	(−1.32)	(3.38)	(5.61)
ROA	−0.010***	0.056***	0.100***
	(−3.23)	(10.93)	(10.69)
Return	0.037	0.143***	−0.028
	(1.19)	(3.54)	(−0.40)
Value	−0.049**	0.338***	0.567***
	(−2.26)	(9.11)	(8.49)
Fixasset	0.022*	−0.123***	−0.145***
	(1.72)	(−5.43)	(−3.58)
PB	0.001	-0.015***	-0.060***
	(1.22)	(−3.04)	(−4.61)
LEV	0.003***	−0.001	0.004*
	(3.40)	(−0.45)	(1.67)
Firmage	−0.041***	0.076***	0.052***
	(−15.34)	(9.11)	(3.36)

Continued

Growth	0.001***	0.001	−0.001
	(3.21)	(1.12)	(−0.88)
State	−0.279***	0.075	−1.365***
	(−8.60)	(0.96)	(−7.36)
COCEN	0.001	−0.005***	−0.013***
	(0.73)	(−3.28)	(−4.87)
Age	−0.014***	0.008	−0.011
	(−3.58)	(1.22)	(−0.99)
Tenure	−0.001	0.025*	0.031
	(−0.13)	(1.84)	(1.36)
EPS	−0.107***	-	-
	(−3.01)	-	-
IMR	-	−4.390***	−5.095***
	-	(−13.13)	(−7.93)
cons	2.036***	−1.503***	−6.088***
	(6.79)	(−3.15)	(−6.95)
Industry/Annual Fixed Effect	Yes	Yes	Yes
N	11,910	7961	7940
Adjust-R2	-	0.102	-

Note: *p < 0.1, **p < 0.05, ***p < 0.01 (two-tailed test).

Columns (2) and (3) are the results of the second phase of regression. Only the company that publishes at least one profit forecast constitutes a sample of this stage. The dependent variables are the equity compensation incentive intensity and the equity compensation dummy variable. The model is set as before, but the inverse mir calculated according to the results of the first stage is added. The ratio (IMR) is used as an additional control variable. It can be found that in both regressions, the coefficients of the IMR are significantly negative, indicating that there is a sample selection bias in the previous analysis. But after we control this deviation, the coefficient of the overconfidence variable is still significantly negative, except that the absolute value of the coefficient is slightly smaller than the result before controlling the sample selection deviation (Table 4 and Table 5). Therefore, the negative impact of executive overconfidence on equity compensation is not seriously affected by sample selection bias.

Through the above three methods for robustness testing, it can be verified that the empirical results in the previous paragraph are indeed robust and effective.

5. Conclusions and Implications

This paper examines the relationship between executive overconfidence and equity compensation incentives by taking samples of Chinese listed companies

from 2010 to 2016. The study found that the company would give overconfident executives a lower-intensity equity compensation incentive. Because overconfident executives have an upward bias toward the company's prospects and equity compensation, lower-intensity equity compensation incentives are enough to encourage executives to work hard, so the company can take this into account when designing executive compensation contracts.

This paper incorporates the psychological factors of executives into the research framework of compensation contract, and considers the influencing factors of executive compensation from the perspective of behavioral finance, and broadens the research perspective of executive compensation. The results of this paper show that when the company signs a compensation contract with the executive, in addition to considering the company's characteristics and executive capacity, it also considers the psychological characteristics of the executive. To a certain extent, overconfidence will alleviate the agency costs brought about by the risk aversion of executives, and will play a certain role in the substitution of equity compensation. Therefore, the company will reduce the incentives for equity compensation granted. In short, whether executives are overconfident is an important consideration for the company to develop an optimal executive compensation contract.

The limitation of this paper is that using simple method instead of Vega to measure the incentive intensity of equity remuneration, which is not accurate measured directly by Vega, and it is what we need further study in the future.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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