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Studies on the Connection between CEO Overconfidence and Business Investment Financing Practices

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Abstract: Various behavioral views of business leaders in the real decision-making of corporate finance currently pose a challenge to the traditional corporate finance theory. This study examines the connection between CEO overconfidence and business operations using data from A-share listed businesses on the Shanghai and Shenzhen stock exchanges in China from 2003 to 2016 from the standpoint of behavioral finance. According to the study, CEOs that are overconfident will typically raise leverage and loan volume, particularly short-term loans; The CEO of a listed business is more likely to be overconfident when economic growth is faster; yet, contrary to the findings of international studies, overconfident corporations did not replace CEOs more frequently than non-overconfident companies, nor did they raise the likelihood of bankruptcy. Lastly, it doesn't seem like the CEO of a state-owned business is more arrogant than the CEO of a private business.

Keywords: CEO; Overconfidence; Enterprise Management

1. Introduction

Numerous studies have demonstrated that a CEO's overconfidence significantly affects the company's performance, future development direction, and finance and investment decisions. Does a CEO who exudes confidence have any benefits or drawbacks for the growth of the company? Scholars have been enthusiastic by this idea of overconfidence ever since ROLL first introduced it to the world of management in 1986. Early research regularly shown that managers are typically overconfident, and that overconfident managers are more likely to make biased decisions that jeopardize the company's ability to grow. Overconfident managers frequently engage in M&A operations that lower the company's value and make excessive or insufficient investments. Thus, it is crucial to research the effects of the CEO's overconfidence on the business. Using real data, this article analyzes the relationship between CEO overconfidence and investment behavior and how it affects corporate success, learning from the findings of research conducted by both domestic and international researchers.

2. Review of literature

We must first consider the factors that will influence the CEO's overconfidence before we can examine the difficulties discussed in this article. Long-serving CEOs are more likely to exhibit overconfidence, as are CEOs of publicly traded companies with high industry risks and CEOs of companies with greater debt ratios, according to research by Rao Yulei and Jia Wenjing [1]. There is no correlation between the CEO's personal attributes and their degree of overconfidence, suggesting that personal attributes like age and educational attainment do not have an impact on the CEO's overconfidence.

According to Heaton's research [2], the overconfidence of the company's senior executives would result in a decrease in the profitability of the business from the perspective of corporate investment and the CEO's overconfidence. According to Malmendier and Tate [3], managers that are overconfident often base their investment decisions on the cash flow situation of the business. They also discovered that the degree of overconfidence is positively correlated with the company's financial standing, particularly for those making the investment. The company's financial situation frequently affects investment choices. According to Tan Chang [4], there is a strong negative correlation between corporate performance and expansionary investment, but a significant positive correlation between CEO overconfidence and expansionary investment. This suggests that expansionary investments will result in a decline in the performance of the company.

In their recent empirical test of French listed companies, Landier and Thesmar [5] examined the relationship between CEO overconfidence and corporate finance and discovered that managers who exhibit overconfidence are more likely to opt for short-term debt financing. This is due to the tendency of overconfident management to overestimate the project's anticipated advantages and the company's operational capability. However, they

believe that they can effectively raise the money required to run the business, meaning they can swiftly take money out to pay off obligations if needed. Additionally, they tend to select short-term liabilities because they underestimate the payback period of investment initiatives. Research by Wang Jing [6] shown that the general manager's and the board of directors' overconfidence tends to extend the duration of debt. At the same time, when the company's internal cash flow is plentiful, the overconfident managers choose internal financing.

3. Hypothesis of research

Hypothesis 1: CEOs who are overconfident often take out more loans
Generally speaking, an overconfident CEO will underestimate the project's risk and overestimate the investment project's potential rewards. Consequently, investments are also made in projects that will unavoidably have a high negative net present value. As a result, CEOs who are overconfident often take out more loans.
Hypothesis 2: CEOs that are overconfident often give out short-term loans rather than long-term ones.
First of all, overconfident CEOs are more likely to pick short-term debt financing because they overestimate the future revenues of investment projects and think their company talents are superior to others. Second, overconfident managers often believe they can easily raise the money required to run the business, meaning they can promptly return money to pay off debts if needed.
Hypothesis 3: Firms with more confidence typically have more leverage than those without.
Corporate finance policies are impacted by the CEO's overconfidence. When CEOs are overconfident and overestimate the return on investment, they are more likely to convert debt into equity because they are unable to completely invest with their own money [7].
Hypothesis 4: The publicly traded business When economic development is faster, the CEO is more likely to become overconfident.

The company's financial status is favorable and it is functioning properly while the economy is doing well. The CEO overestimates the future revenues of investment projects because he has excellent reason to think that his business acumen is superior to that of other companies. This leads him to feel that future projects will be profitable. A listed company's CEO is more likely to exhibit overconfidence and increase the company's stock holdings.

4. Data processing

4.1. Sources of data

This study uses listed companies from the Shanghai and Shenzhen Stock Exchanges' A-share market as samples to examine the validity of the aforementioned hypotheses. The study period spans from 2003 to 2016. This article does not include financial listed firms because of the unique characteristics of financial companies and the fact that financial data differs greatly from that of other industries. To investigate if there is a substantial causal association between a CEO's overconfidence and a company's poor management, this article, in contrast to earlier research, keeps ST listed companies and treats ST and ST* listed companies as dummy variables. The CSMAR series research database contains all of the sample company's financial and corporate governance information. The Wind database is the source of the Shanghai A-share index.

4.2. Measurement of overconfidence

Two techniques are used in this article to gauge the CEO's overconfidence. According to the first approach, a CEO is considered overconfident if, during his tenure, he has never decreased the company's stock—that is, if his share count has remained constant or even increased. Adding a restriction condition based on technique one is the second approach. The CEO may hold the company's shares or remain unchanged if the stock price growth rate is less than the market's overall growth rate, which may indicate overconfidence. The following requirements are met:

① Holdi_Holdi-1≥0
② Indexi/Indexi-1< Pricei/Pricei-1

The CEO of the company is said to be overconfident if these two criteria are met simultaneously. The closing price of the company's shares at the end of year I is known as Pricei, the number of shares owned by the CEO at the end of year I is known as Holdi, and the Shanghai Stock Exchange A-Share Index at the end of year I is known as Indexi.

4.3. Sources and definitions of variables

Table 1 Sources and definitions of variables

Variable type	variable name	Variable source
Explained variable	Short	CSMAR database
	T_loans	CSMAR database
	C_L_loans	CSMAR database
	leverage	CSMAR database
	Market_leverage	CSMAR database
	Book_leverage	CSMAR database
Explanatory variables	T_assets	CSMAR database
	Book_leverage	CSMAR database
	ROA	CSMAR database
	Debt_assets_ratio	CSMAR database
virtual variable	OC1	CSMAR database
	OC2	CSMAR database
	TURNOVER	CSMAR database
	ST	CSMAR database
	Control	CSMAR database
	OC_GDP	CSMAR database

5. Analysis of measurement results

5.1. Descriptive statistics

Table 2 Descriptive statistics

variable	N	mean	sd	p25	p50	p75
Short	19926	0.260	0.220	0.0500	0.230	0.410
T loans	19928	3.800e+09	1.600e+10	3.500e+08	9.000e+08	2.400e+09
C L loans	17019	0.0100	0.0200	0	0.0100	0.0100
leverage	19926	3.430	6.160	1.600	2.170	3.400
Market lev~e	19926	0.430	6.430	0.380	0.540	0.710
Book lever~e	19928	8.350	6.650	4.470	6.750	10.14
T assets	19928	6.400e+09	2.200e+10	1.100e+09	2.100e+09	4.700e+09
ROA	19925	-0.0400	16.14	0.0100	0.0300	0.0600
Debt asset~o	19926	0.570	6.430	0.290	0.460	0.620
OC1	20024	0.330	0.470	0	0	1
OC2	20024	0.360	0.480	0	0	1
TURNOVER	20024	0.0600	0.240	0	0	0
ST	20024	0.0400	0.200	0	0	0
Control	20024	0.500	0.500	0	0	1
OC GDP	19928	0.400	0.490	0	0	1

5.2. The effect of CEO overconfidence on corporate loans and leverage

To quantify the impact of CEO overconfidence on corporate lending and leverage, the first econometric model was created. We analyze the impact of CEO overconfidence on business operations in Chinese A-share listed companies using multiple regression models. We have designed an econometric model as follows:

$$Annual\_Rate = \alpha + \beta_{1OC} + \beta_{2Z} + V_i + \mu_t + \epsilon \quad (1)$$

The company's short-term loan rate, total loans, change rate of total loans, leverage, book leverage, and market leverage are the six independent variables that are represented by the dependent variable Annual_Rate in this calculation; OC is a dummy variable. OC is 1 if the company is overconfident; else, it is 0. Total assets, book leverage, return on assets, asset-liability ratio, and fixed effects—which stand for the bank and the year, respectively—represent random errors. Z is the attributes of the company's assets. The regression analysis of CEO's overconfidence and corporate loan relationship is as follows:

Table 3 CEO's overconfidence and corporate loans

	(1)	(2)	(3)	(4)	(5)
	Short_loans	Short_loans	C_loans	C_loans	T_loans
OC1	0.0114***		0.00277***		436690619.3**
	(2.75)		(6.29)		(2.05)
OC2		0.0259***		0.00292***	
		(5.98)		(6.84)	
_cons	0.251***	0.246***	0.00776***	0.00755***	3.64627e+09***
	(146.55)	(129.59)	(29.72)	(27.91)	(41.36)
N	19926	19926	17019	17019	19928

Note: *, **, and *** indicate the significance levels of 5%, 1%, and 0.1%, respectively

Table 4 CEO's overconfidence and corporate loans

	(6)	(7)	(8)	(9)	(10)
	Short_loans	Short_loans	C_loans	C_loans	T_loans
OC1	0.0120***		0.00243***		330549790.3*
	(2.91)		(5.57)		(1.66)
T_assets	-4.13e-13***	-4.20e-13***	-4.50e-14***	-4.36e-14***	
	(-3.45)	(-3.51)	(-4.44)	(-4.32)	
Book_lever	-0.00170***	-0.00165***	0.000576***	0.000580***	635024902.5***
	(-6.11)	(-5.93)	(18.00)	(18.21)	(51.08)
ROA	-0.000297**	-0.000299**	-0.0000796***	-0.0000786***	6917251.2
	(-2.08)	(-2.09)	(-3.73)	(-3.69)	(1.01)
Debt_assets	-0.000294	-0.000299	-0.000233***	-0.000230***	21149927.6
	(-0.81)	(-0.82)	(-4.33)	(-4.28)	(1.21)
OC2		0.0254***		0.00287***	
		(5.89)		(6.79)	
_cons	0.268***	0.263***	0.00354***	0.00319***	-1.63367e+09***
	(97.27)	(90.20)	(9.83)	(8.61)	(-12.34)
N	19924	19924	17017	17017	19925

Note: *, **, and *** indicate the significance levels of 5%, 1%, and 0.1%, respectively

The main results are shown in Table 1 and Table 2. For each dependent variable, we measure the CEO's overconfidence effect from two aspects. The first aspect includes only the CEO's overconfidence variables, and the second aspect adds control over the bank's characteristics. In order to save space, we do not report the year dummy variable in the analysis. In all models, our regression includes all available non-financial listed companies' available data.

By comparing the two overconfidence variables OC1 and OC2, it is not difficult to find that OC2 has a larger t value than OC1, which indicates that the second defined overconfidence variable has a more significant regression result. This is theoretically in line with expectations, because the second definition of overconfidence is to add a constraint under the first definition. It must be met if the CEO’s stock returns are lower than the market returns. Reduce the company's stock condition. This also shows on one side that it is more valuable to use OC2 to define overconfidence and that the defined overconfidence CEO is more targeted.

To further study our hypothesis, we used different types of leverage as the dependent variables to study the relationship between CEO overconfidence and corporate leverage. The results of the regression are shown in Table 3.

Table 5 CEO's overconfidence and corporate leverage

	(1) Market_leverage	(2) Market_leverage	(3) Book_leverage	(4) Book_leverage	(5) leverage	(6) leverage
OC2	0.235**	-0.000215			0.739***	0.744***
	(2.48)	(-0.61)			(6.37)	(6.47)
T_assets		7.49e-17		1.27e-10***		-9.38e-12***
		(0.01)		(50.14)		(-3.56)
Book_lever		-0.0000222				-0.0526***
		(-0.82)				(-6.55)
ROA		-0.0000114		-0.00426		-0.0157***
		(-0.54)		(-1.09)		(-3.16)
Debt_assets		-1.000***		-0.0162		-0.0474***
		(-18883.69)		(-1.63)		(-3.76)
OC1			0.293*	0.229**		
			(2.64)	(2.18)		
_cons	0.348***	1.000***	8.375***	7.632***	3.518***	4.035***
	(6.09)	(3294.97)	(66.20)	(61.52)	(40.03)	(37.32)
N	19926	19925	19928	19925	19926	19924

Note: *, **, and *** indicate the significance levels of 5%, 1%, and 0.1%, Respectively

We found that the coefficient of OC in model 2 is negative, and the absolute value of the coefficient is very small and not significant. We can think that this is because the influence of other factors on market leverage has weakened the influence of OC. In addition to model 2, it can be seen that the coefficient of OC is always significantly positive regardless of the type of leverage used, and is statistically significant at 5% or better. For example, a coefficient of 0.235 for Model 1 suggests that the average annual market leverage rate of overconfidence firms is 23.5% higher than that of non-overconfident firms, which is statistically significant and provides sufficient evidence to support Hypothesis 3. (Overconfident companies often have higher leverage than non-overconfident companies.)

5.3. Endogenousissues

Endogenous issues may arise from the effect of CEO overconfidence on company credit and leverage. In order to ascertain whether the regression results in Table 6 are endogenously resilient, we employ a 2SLS corporate regression model.

Selecting a suitable external tool variable is crucial for this type of 2SLS regression study. This variable has an economic relationship with the CEO's overconfidence, but it has nothing to do with the error items pertaining to the silver enterprise's loans and leverage regression.
In order to identify such a tool, we looked at a factor that has been demonstrated in the literature on overconfidence to be a predictor of CEO overconfidence: the age of the CEO.

According to Bruin, Parker, and Fischhoff [8], there is a substantial correlation between overconfidence and age. They think that older people are more likely to be overconfident than younger persons in senior positions, including the CEO role. In a similar vein, Crawford and Stankov [9] discovered that older adults had higher levels of overconfidence than younger ones. Consequently, we think that the CEO's overconfidence is positively correlated with their age. It is also improbable that the instrument will be associated with the error term in the second phase of the regression as we have no reason to think that it directly affects corporate loans and leverage.

In the 2SLS model, we see the OC as an endogenous variable that interacts with CEO age in the first stage. Stage 1: Regressing instrument variables and other exogenous variables of the model to OC

$$P(OC|\ CEO\ Age, Z) = L\ (\delta 1 + \delta 2\ CEO\ Ag\ e + \theta Z + V_i + \mu_t) \quad (2)$$

Stage 2: In the main regression equation, use OC's fitting value OC3 instead

$$Annual\ Rate = \alpha + \beta_{1OC3} + \beta_{2Z} + V_i + \mu_t + \epsilon \quad (3)$$

The company's short-term loan rate, total loans, change rate of total loans, leverage, book leverage, and market leverage are the six independent variables represented by the dependent variable Annual_Rate in this formula. OC is a dummy variable; if the company is overconfident, OC equals 1; if not, it is zero; OC3 is the

predicted value of OC generated in the first stage regression; and CEO Age is the age of the CEO. Total assets, book leverage, return on assets, asset-liability ratio, and fixed effects—which stand for the bank and the year, respectively—represent random errors. Z is the attributes of the company's assets. The regression results are shown in Table 6, in parentheses based on robust standard errors for heteroskedastic adjustments [10]. *, **, and *** indicate significance at 10%, 5%, and 1% levels, respectively.

Table 6 Effect of CEO overconfidence on corporate loans and leverage under 2SLS model analysis

stage	First	Second	Second	Second	Second	Second	Second
	OC2	C_L_loans	leverage	Book_leverage	Market_leverage	Short	T_loans
age	0.00438***	-0.000395***	-0.0843***	-1.014***	-1.098***	-0.00125**	-9385493.5
	(8.37)	(-6.01)	(-5.16)	(-91.10)	(-17073.61)	(-2.17)	(-1.22)
T_assets	-6.49e-13***	5.92e-15	3.62e-12	2.15e-10***	1.63e-10***	-7.02e-13***	0.713***
	(-3.93)	(0.47)	(1.19)	(110.23)	(13546.46)	(-6.55)	(495.27)
Book_lever	0.00157***	0.000433***	-0.113***		-0.393***	-0.000759**	41407488.0***
	(2.90)	(12.05)	(-12.92)		(-11434.56)	(-2.47)	(10.04)
ROA	-0.00128***	-0.0000033	-0.000562	-0.0215***	0.321***	-0.000142	178617.6
	(-3.04)	(-0.31)	(-0.21)	(-9.82)	(30113.12)	(-1.50)	(0.14)
Debt_assets	-0.00399***						
	(-3.78)						
OC3		0.0630***	20.43***	236.9***	250.6***	-0.0999	-5.93609e+09***
		(4.73)	(6.05)	(109.58)	(18875.73)	(-0.84)	(-3.73)
_cons	0.149***	0.000521	0.927	-31.04***	-36.36***	0.362***	1.47161e+09***
	(5.92)	(0.22)	(1.58)	(-73.86)	(-15803.88)	(17.60)	(5.34)
N	19901	16997	19900	19901	19901	19900	19901

Note: *, **, and *** indicate the significance levels of 5%, 1%, and 0.1%, respectively

As shown in the above table, the CEO's overconfidence is positively related to the year-on-year loan change rate (C_L_loans), corporate leverage, book leverage, and market leverage, and is highly significant. This also validates our hypothesis3 (overconfident companies often have higher leverage than non-overconfident companies).

The OC coefficients in Models 1 and 2 above are both positive and statistically significant. This supports Hypothesis 1, which states that overconfident businesses make more aggressive loan decisions than non-overconfident businesses in years when there is no crisis. The coefficient of OC3 in model 2, for instance, is 0.0630 after adjusting for company characteristics. This suggests that, on average, during the crisis, the annual change rate of loans for overconfident companies was 6.3% greater than that of non-overconfident companies.

Model 3-5 employs several forms of leverage as dependent variables in order to examine our hypothesis 2 in more detail. The coefficient of OC is statistically significant at 5% or more and is substantially positive regardless of the type of leverage. For instance, overconfident firms had an average leverage change rate of 20.43% higher than non-overconfident organizations, according to Model 3's coefficient of OC. This demonstrates that organizations with overconfidence make more aggressive lending selections than those without. Overconfidence firms have an average yearly market leverage that is 250.6% more than that of non-overconfident enterprises, according to Model 4's OC coefficient of 250.6. Evidence that overconfident businesses typically have more power than non-overconfident businesses may be found in this.

In summary, these findings confirm our first two hypotheses: Compared to non-overconfident enterprises, overconfident firms are more aggressive. Additionally, overconfident businesses have greater clout than underconfident ones.

6. Conclusions

This article investigates the connection between business investment funding practices and CEO overconfidence. The findings indicate that: Overconfident CEOs are more likely to increase their leverage and take out more loans, particularly short-term loans; listed company CEOs are more likely to be overconfident when economic growth is faster. However, contrary to the findings of international research, overconfident

companies did not experience a higher rate of CEO turnover or an increased likelihood of bankruptcy compared to non-overconfident enterprises. Lastly, there was no indication that the CEOs of state-owned businesses were more arrogant than those of private businesses.

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