



CEO Overconfidence as a Driver of R&D Intensity: Market Competition's Catalytic Role in Chinese Listed Firms

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Abstract. In the context of national ideation-driven strategies, corporate R&D expenditure emerges as a pivotal driver for enhancing national competitiveness and sustainable corporate growth. However, prior studies predominantly adopt agency theory and executive characteristic lenses, lacking consensus on how irrational traits (e.g., overconfidence) shape innovative investment decisions. Consequently, this paper investigates the relationship between CEO overconfidence and corporate Ideation expenditure using data from China's A-share listed companies. This paper selects data from A-share listed companies spanning 2014 to 2023 as the sample to verify the impact of CEO overconfidence on the intensity of corporate ideation investment. The findings reveal that CEOs, as the core decision-makers of corporate strategy, significantly Amplify corporate ideation investment through their overconfidence. Industry competition exacerbates the promoting impact of overconfident CEOs on R&D spending. This paper provides practical approaches for improving C-suite hiring and ideation-linked remuneration schemes in addition to enhancing the theoretical framework at the nexus of behavioral finance and ideation management.

Keywords: CEO overconfidence, Corporate ideation investment, Industry competition.

1 Introduction

Driven by the dual forces of intensifying global technological competition and China's economic transformation and upgrading, corporate ideation investment, as the core driver of the national ideation system, remains a critical topic in corporate finance. However, empirical evidence from the OECD Science, Technology and Ideation Outlook 2023 indicates that Benchmarking against global standards reveals a 0.3-percentage-point deficit in China's corporate R&D expenditure ratio (2.4% vs. OECD 2.7%) [1], compounded by suboptimal ideation resource distribution. With notable imbalances in ideation resource allocation. While traditional agency frameworks emphasize contractual design [2] and ownership structures [3], they fail to explain heterogeneity in CEO-driven decisions. Behavioral finance offers a new lens to address this puzzle.

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Substantial evidence indicates that CEOs, as core strategic decision-makers, systematically influence risk preferences and investment choices through their overconfidence bias [4]. Specifically in the ideation domain, overconfidence leads CEOs to overestimate ideation success rates, thereby escalating R&D commitments of ideation projects [5] but may also misallocate ideation resources by over-relying on their own judgment and ignoring market feedback [6, 7]. While research on ideation investment and related aspects exists, the influence of executives' irrational traits, especially overconfidence, on ideation behavior is receiving increasing attention in the face of rapidly changing business environments and high-risk ideation decisions. However, most literature is based on Western data, overlooking how this psychological bias affects corporate Ideation expenditure within China's unique institutional environment and corporate governance context.

Consequently, based on data from China's A-share listed companies, this paper systematically investigates the mechanism through which CEO overconfidence affects corporate ideation investment, aiming to provide empirical evidence on the impact of CEO overconfidence on corporate ideation investment in the Chinese market, thereby offering insights for policy formulation and corporate practice.

2 Theoretical Analysis and Research Hypotheses

Numerous scholars have conducted empirical Examining the causal linkage between managerial overconfidence and corporate ideation investment behavior. Empirical consensus confirms that competitive markets amplify overconfident executives' ideation gambles—a pattern robustly validated in cross-national settings, Zhang Xindong et al. observed a stronger R&D impetus in state-owned enterprises, attributable to their unique governance mechanisms [8]. Notably, Zhu Yongming et al., using a risk decision model, verified that such CEOs exhibit significant cognitive bias in ideation project evaluation: their systematic underestimation of risk probabilities may lead to Inefficient capital deployment, ultimately resulting in diminishing marginal returns on ideation investment. Based on this, this paper proposes hypothesis H1:

H1: Overconfident CEOs exhibit systematic bias toward elevated R&D commitments.

Existing research suggests that CEO overconfidence may influence corporate behavior through strategic choices. Miles and Snow's corporate competitive strategy framework indicates that prospector firms tend to gain competitive advantage through ideation and technological breakthroughs, while defender firms focus more on efficiency and risk control [9]. It follows that overconfident CEOs, compared to non-overconfident CEOs, have a stronger preference for success and expect to prove their capabilities by implementing more challenging strategies [10]. For instance, Galasso et al.'s research shows that overconfident CEOs are more inclined to deviate from established company strategies and implement more challenging and risky technology-oriented strategies [11]. Based on this, this paper proposes hypothesis H2:

H2: The impact of CEO overconfidence on corporate ideation expenditure might be positively moderated by the level of industry rivalry.

3 Research Design

3.1 Research Sample

This study selects data from A-share listed companies from 2014 to 2023 as the sample, sourced from the CSMAR database. Due to data requirements for the models, The first sample underwent the following processing: First, because their accrual earnings differ from those of other industries, businesses in the insurance and financial sectors were not included. Then, all samples with incomplete data were removed. Finally, to mitigate the influence of outliers, ST and PT companies (indicating poor performance) were excluded, and a 1% and 99% fissurization was applied to all continuous variables. After the above screening, a final sample of 21,796 qualified listed company observations was obtained. Variable information is shown in Table 1.

Table 1. Variable Definitions

Variable Nature	Variable abbreviation	Full name of the variable	Variable definition
Dependent Variable	RD	Research and development investment	Research and development investment amount/Operating total revenue
Independent Variable	OC1	CEO's excessive confidence	Following the approach of WeiZheHai (2018), researcher will analyze from aspects: the gender, age, educational background, and dual role holding of the CEO
Moderating Variable	HHI	Market concentration	Computed by summing squared market shares derived from primary business revenue. Lower values denote fiercer competition; higher values indicate market concentration.
Control Variables	Size	Company size	Log-transformed annual total assets (Ln(TA))
	Lev	Asset-liability ration	Total liabilities at the end of the year are divided by total assets at the end of the year.

ROA	Total Asset Net Profit Margin	Net profit/average total assets balance
Cashflow	Cash flow ratio	Cash flow from operating activities
FIXED	Proportion of fixed assets	The ratio of net fixed assets to total assets
Firm Age	Company establishment year	In (the year of the company's-the year of company establishment+1)

3.2 Model Specification

This study employs basic linear regression models, specified as follows (1) and (2):

$$RD_{i,t} = a_0 + a_1OC1_{i,t} + \Sigma controls_{i,t} + \Sigma industry_i + \Sigma year_t + \varepsilon_i \tag{1}$$

$$RD_{i,t} = a_0 + a_1OC1_{i,t} + a_2OC1 \times HHI_{i,t} + a_3HHI_{i,t} + \Sigma controls_{i,t} + \Sigma industry_i + \Sigma year_t + \varepsilon_{i,t} \tag{2}$$

In the above formulas, controls represent control variables, industry is industry fixed effects, year is year fixed effects, i deattentions different firms, t detentions different years, ε is the random disturbance term, and a_0 is the intercept term

4 Empirical Analysis

4.1 Descriptive Analysis

Table 2. Descriptive Statistics

Var Name	Obs	Mean	SD	Min	Median	Max
RD	21796	0.0597	0.0607	0.0004	0.0423	0.3638
OC1	21796	0.6740	0.1571	0.3032	0.6455	0.9402
HHI	21796	0.1212	0.1277	0.0267	0.0840	0.8597
Size	21796	21.9596	1.1296	19.9602	21.7925	25.6739
Lev	21796	0.3690	0.1906	0.0493	0.3527	0.8440
ROA	21796	0.0464	0.0654	-0.2112	0.0459	0.2265
Cashflow	21796	0.0490	0.0655	-0.1440	0.0481	0.2307
FIXED	21796	0.1935	0.1360	0.0038	0.1691	0.6223
Firm Age	21796	2.9261	0.3129	2.0794	2.9444	3.5553

Table 2 show the descriptive statistics. The data used in this study comes from A-share listed businesses. from 2014-2023, with a sample size of 21,796 observations covering multiple key financial indicators. According to the descriptive statistics. First, the mean Ideation expenditure (RD) is 0.0597 with a 0.0607 standard deviation, showing that R&D expenditure expressed per unit of revenue is relatively small for most firms, but

varies significantly across firms, showing considerable fluctuation. The maximum value of 0.3638 suggests that some companies invest a large proportion in R&D, possibly in high-tech or ideation-driven industries. The mean CEO overconfidence (OC1) is 0.6740 with a standard deviation of 0.1571, ranging from 0.3032 to 0.9402, implying that the overconfidence scores of most CEOs are moderately high, with some variation across companies. Higher overconfidence scores may be related to corporate decision-making risks and innovative behavior. Market concentration (HHI) has indicated that market competition is relatively fierce in most industries, but high market concentration exists in some sectors, dominated by a few firms. Firm size (Size) has a mean of 21.9596 and a standard deviation of 1.1296, showing significant variation in firm size, with the Ln-transformed total assets concentrated in a higher range for most companies. The asset-liability ratio (Lev) has a mean of 0.3690 and a standard deviation of 0.1906, indicating that firms' leverage levels vary within a certain range, and firms with higher debt ratios may face greater financial pressure. Reflecting considerable variation in profitability among the sample, with some firms experiencing losses (minimum ROA is negative: -0.2112). The cash flow ratio (Cashflow) has a mean of 0.0490 and a standard deviation of 0.0655, indicating unstable cash flow stability, and some companies may face significant cash flow pressure. Suggesting that some companies have a relatively high proportion of fixed assets, likely in capital-intensive industries. Finally, firm age (Firm Age) has a mean of 2.9261 and a standard deviation of 0.3129, indicating that most firms are relatively young, belonging to emerging or growth-stage companies.

4.2 Correlation Analysis

Table 3. Correlation Analysis

	RD	OC 1	HH I	Siz e	Lev	RO A	Cas hflo w	FIXE D	Fir m Ag e
RD	1								
OC1	0.17 1 ***	1							
HHI	- 0.16 0 ***	- 0.033 ***	1						
Size	- 0.21 0 ***	0.090 ***	0.063 ***	1					
Lev	- 0.30 0	- 0.066 ***	0.073 ***	0.500 ***	1				

ROA	-		-	-	-	1			
	0.09		0.039	0.028	0.372				
	6		***	***	***				

Cash-flow	-	-	0.012	0.071	-	0.459	1		
	0.12	0.032	***	***	0.168**	***			
	1	***			*				

FIXED	-	-	0.028	0.143	-	0.188		1	
	0.25	0.116	***	***	0.097**	*			
	2	***			*	**			

Firm Age	-	-		0.175	0.142	-	0.035	0.070**	1
	0.12	0.101	0.008	***	***	0.095	***	*	
	0	***				***			

Note: Symbol density escalates with significance: ***for 10%, **for 5%, * for 1%, respectively.

As shown in Table 3, OC1 exhibits a statistically significant positive coefficient ($\beta = 0.0293$, $p < 0.01$), confirming H1 that CEO overconfidence drives R&D intensity. Notably, larger firms increase R&D (Size: $\beta = 0.0032$), whereas high leverage (Lev: $\beta = -0.0860$) and cash constraints (Cashflow: $\beta = -0.0259$) suppress it. This result indicates that higher levels of CEO overconfidence are associated with a larger proportion of corporate investment in R&D, validating Hypothesis 1 that CEO overconfidence significantly Amplify Ideation expenditure. The positive impact of CEO overconfidence may stem from their high expectations for future technological ideation and excessive optimism about investment decisions. Overconfident CEOs often overestimate their judgment capabilities and tend to allocate more resources to long-term, highly innovative projects, thereby driving corporate R&D activities. This phenomenon is particularly prominent in high-risk and high-uncertainty environments, where the CEO's decision-making inclination can play a decisive role in the company's R&D strategy. Furthermore, the regression model controls several important firm characteristic variables. Firm size (Size) in Model (2) has a regression coefficient of 0.0032 (t-value 8.8761), also significantly positively affecting Ideation expenditure, indicating that larger firms tend to invest more in R&D. Variables such as the asset-liability ratio (Lev), return on assets (ROA), and cash flow ratio (Cashflow) all show significant negative impacts on Ideation expenditure, indicating that firms with high debt, poor profitability, and cash flow constraints face limitations on Ideation expenditure. The baseline regression results provide strong support for Hypothesis 1, demonstrating that CEO overconfidence does indeed drive corporate investment in R&D to some extent. This finding provides a theoretical basis for subsequent research and suggests that companies need to pay attention to the potential impact of CEO individual traits on resource allocation during

decision-making processes Heading (Third Level). Only two levels of headings should be numbered. Lower level headings remain unnumbered; they are formatted as run-in headings.

4.3 Baseline Regression Analysis

Table 4. Baseline Regression Analysis

	(1)	(2)
	RD	RD
OC1	0.0368*** (16.9263)	0.0293*** (14.1254)
Size		0.0032*** (8.8761)
Lev		-0.0860*** (-38.7804)
ROA		-0.1773*** (-29.1242)
Cashflow		-0.0259*** (-4.4889)
FIXED		-0.0305*** (-10.1324)
Firm Age		-0.0192*** (-17.1008)
_cons	0.0190*** (2.9588)	0.0538*** (5.4619)
industry	Yes	Yes
year	Yes	Yes
N	21796	21796
F	141.8430	178.1711
R2	0.3460	0.4166

Note: Symbol density escalates with significance: ***for 10%, **for 5%, * for 1%, respectively.

As shown in Table 4, OC1 exhibits a statistically significant positive coefficient ($\beta = 0.0293$, $p < 0.01$), confirming H1 that CEO overconfidence drives R&D intensity. Notably, larger firms increase R&D (Size: $\beta = 0.0032$), whereas high leverage (Lev: $\beta = -0.0860$) and cash constraints (Cashflow: $\beta = -0.0259$) suppress it. This result indicates that higher levels of CEO overconfidence are associated with a larger proportion of corporate investment in R&D, validating Hypothesis 1 that CEO overconfidence significantly Amplify Ideation expenditure. The positive impact of CEO overconfidence may stem from their high expectations for future technological ideation and excessive optimism about investment decisions. Overconfident CEOs often overestimate their judgment capabilities and tend to allocate more resources to long-term, highly innovative projects, thereby driving corporate R&D activities. This phenomenon is particu-

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4.4 Robustness Test

Table 5. Robustness Test

	(1)
	RD
OC2	0.0022** (2.2614)
Size	0.0032*** (8.5181)
Lev	-0.0856*** (-38.2793)
ROA	-0.1783*** (-29.1580)
Cashflow	-0.0255*** (-4.4002)
FIXED	-0.0340*** (-11.1054)
Firm Age	-0.0220*** (-17.6046)
_cons	0.0786*** (8.0726)
industry	Yes
year	Yes
N	21796
F	174.3757
R2	0.4114

Note: *, **, *** represent significance at the 10%, 5%, and 1% levels, respectively; t-values in parentheses.

In this study, to verify the robustness of the baseline regression results, CEO overconfidence was remeasured (Table 5). OC2, as an alternative measure of CEO overconfidence, yielded significant results in the robustness test. The regression analysis shows that OC2 has a significant positive impact on R&D investment (RD), with a coefficient of 0.0022 (t-value 2.2614), significant at the 5% level. This result is consistent with the findings for the OC1 variable in the baseline regression, indicating that CEO overconfidence, whether measured by the original method (OC1) or the alternative variable (OC2), significantly promotes corporate R&D investment. In conclusion, the robust test results using the alternative variable OC2 are consistent with the baseline regression results, demonstrating that the role of CEO overconfidence in promoting R&D investment is robust. This provides strong support for the conclusions of this study and enhances the reliability of the findings. By using an alternative variable, the study can partially rule out potential confounding factors, ensuring that the impact of overconfidence on R&D investment is genuine and generalizable.

4.5 Moderating Effect

Table 6. Moderating Effect

	(1)
	RD
OC1	0.0372*** (13.0492)
HHI	0.0566*** (4.4140)
OC_HHI	-0.0669*** (-4.0534)
Size	0.0032*** (8.8289)
Lev	-0.0859*** (-38.7242)
ROA	-0.1767*** (-29.0392)
Cashflow	-0.0265*** (-4.5946)
FIXED	-0.0300*** (-9.9581)
Firm Age	-0.0192*** (-17.0759)
cons	0.0436*** (4.2878)
industry	Yes
year	Yes
N	21796
F	174.5300
R2	0.4171

Note: *, **, *** represent significance at the 10%, 5%, and 1% levels, respectively; t-values in parentheses.

The regression analysis of the moderating effect (Table 6) further validates Hypothesis 2, namely that industry concentration (HHI) has a significant moderating effect on the relationship between CEO overconfidence and R&D investment. The regression results show that industry concentration (HHI) has a significant moderating influence on the relationship between CEO overconfidence (OC1) and R&D investment (RD). The regression coefficient of the interaction term OC_HHI is -0.0669 (t-value = -4.0534), indicating that lower industry concentration (higher industry competition) strengthens the promoting effect of CEO overconfidence on R&D investment. This finding suggests that in environments with higher industry competition, CEO overconfidence exerts a stronger driving force on R&D investment. Specifically, in fiercely competitive industries, CEOs often make more innovative decisions through overconfidence, aiming to enhance the company's market competitiveness via R&D. In this context, the level of market concentration may influence the CEO's optimistic expectations in R&D decisions. When industry competition is high, companies may support large-scale R&D investments to gain dominance in the market. Therefore, increased industry competition further amplifies the positive impact of CEO overconfidence on R&D investment. Overall, the moderating effect regression analysis results support Hypothesis 2, demonstrating that industry competition significantly moderates the relationship between CEO overconfidence and R&D investment.

5 Conclusions

This study based on the data of A-share listed companies from 2014 to 2023, systematically examines the influence mechanism of CEO overconfidence on corporate Ideation expenditure and the Contingent role of the market environment. The empirical results show that CEO overconfidence significantly Amplify corporate Ideation expenditure. The overconfidence trait prompts managers to be more inclined to implement an ideation-driven strategy. This conclusion remains robust after replacing the measurement method of the core variable. Market concentration has a significant negative Contingent role. The higher the degree of industry competition, the stronger the promoting effect of CEO overconfidence on Ideation expenditure, confirming the synergy effect between competitive pressure and managers' risk-taking tendencies. The analysis of control variables shows that enterprise scale positively affects Ideation expenditure, while high debt ratio, low profitability and cash flow significantly inhibit ideation investment. This research uncovers a synergistic interplay between CEO psychology and competitive dynamics: Heightened industry rivalry amplifies overconfidence-induced Ideation expenditure, whereas debt burdens and cash flow shortages curtail ideation. Findings offer practical guidance for strategic talent sourcing and ideation-oriented policy calibration, empowering stakeholders to leverage behavioral biases for competitive advantage.

Authors Contribution. All the authors contributed equally and their names were listed in alphabetical order.

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