

Optimizing Managerial Human Capital: The Role of Inverse Age Relationship Between Superiors and Subordinates in Chinese Listed Companies' Performance

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Abstract: The exploration of managerial traits and their implications for corporate strategy and performance has long been a central focus within the realm of management research. Existing research has explored various aspects such as the psychological traits of managers, the characteristics of executive teams, and the influence of demographic factors like age, gender, and education. However, limited attention has been paid to the specific impact of the inverse age relationship between superiors and subordinates on firm performance, particularly in the context of Chinese listed companies. This paper investigates the impact of the inverse age relationship between superiors and subordinates on firm performance. Specifically, this research endeavors to investigate how the age disparity between CEOs and other executives influences corporate performance, whether the actual age of the CEO moderates this relationship, and what functions corporate governance and cultural context fulfill within this dynamic. The paper analyze data from Chinese A - share listed companies from 2010 to 2020 sourced from the CSMAR database. EXCEL was used for data processing and initial analysis, while SPSS was applied for advanced statistical analysis and modeling. This study bridges a research gap by providing insights into optimizing managerial human capital allocation, which is of great significance for enterprises to better leverage the complementary strengths of young talents and experienced managers, thereby enhancing overall performance and competitiveness in the market. The following chapters will elaborate on the literature review, research design, empirical results, and conclusions of this study.

Keywords: Inverse age relationship, Firm performance, CEO authority, R&D mediation, Chinese listed companies

1. Introduction

The study of managerial traits and their impact on corporate strategy and performance has long been a focal point in management research. Existing research has explored various aspects such as the psychological traits of managers, the characteristics of executive teams, and the influence of demographic factors like age, gender, and education. However, limited attention has been paid to the specific impact of the inverse age relationship between superiors and subordinates on firm performance, particularly in the context of Chinese listed companies.

This paper investigates the impact of the inverse age relationship between superiors and subordinates on firm performance.

Specifically, we aim to explore how the age difference between CEOs and other executives affects corporate performance, whether the CEO's actual age moderates this relationship, and what role corporate governance and cultural context play in this dynamic.

Employing a regression model, we conduct an analysis of data from Chinese A - share listed companies spanning from 2010 to 2020, which is sourced from the CSMAR database.

This research fills a research void by offering in - depth insights into the optimization of managerial human capital allocation. Such insights are of profound significance for enterprises to more effectively harness the complementary advantages of young talents and experienced managers, thereby augmenting their overall performance and competitiveness in the market.

2. Literature review

Accumulating research evidence indicates that the heterogeneity in team age and tenure exerts a notable influence on corporate performance. For instance, Wei Liqun and Wang Zhihui [1], Zhang Ping [2], and Wang Daoping [3] have posited that maintaining a moderate level of such heterogeneity is conducive to promoting more effective teamwork.

Psychological research has revealed that younger executives tend to advocate aggressive strategies and make substantial investments in R & D, in contrast to older executives who typically lean towards conservative approaches. As Child [4] has pointed out, aging managers often exhibit resistance to organizational changes and place greater emphasis on short - term gains. Dechow [5] confirm CEOs reduce R&D spending near retirement.

Wei Liqun & Wang Zhihui [1] found young teams may harm performance. Wiersema [6] and Hambrick [7] show older teams reduce risks while younger teams innovate. Age heterogeneity enables diverse decision-making perspectives. Carpenter [8] state diverse executive teams offer richer solutions and market insights.

Research regarding the impact of executive age on corporate performance has yielded conflicting conclusions. In the context of Chinese studies, such contradictions are particularly evident. For example, Li Yan [9] discovered that younger executives tend to scale back investment, while Wei Liqun and Wang Zhihui [1] observed that the experience of mature executives significantly contributes to enhanced performance within China's developing market. Key literature findings: 1) Multiple factors affect performance including governance and managerial traits; 2) Performance measurement lacks consensus across contexts; 3) Upper Echelon Theory highlights executives' characteristics influence R&D and mergers; 4) No unified conclusion on age-performance relationship, though negative correlation is widely accepted. Existing research gaps include single-indicator focus, addressed here through multi-variable age analysis to inform executive hiring decisions.

In view of the inconsistent research outcomes and prevalent research gaps within the existing literature concerning the impact of age - related factors on firm performance, particularly the under - explored domain of the inverse age relationship between superiors and subordinates, this research puts forward the following hypotheses with the aim of further deepening our comprehension in this specific area.

Hypothesis A1: Management reverse age relationship harms performance.

Hypothesis A2: Management reverse age relationship benefits performance.

Hypothesis B: Younger CEOs amplify the performance impact of superior-subordinate reverse age relationships.

3. Research design

3.1. Sample selection and data source

In this study, we designated China's A - share listed companies spanning from 2010 to 2020 as the research sample. The financial data of the sample companies and the pertinent data of the senior management team were collected and collated from the CSMAR database, yielding a total of 10,898 observations. EXCEL was utilized for data processing and preliminary analysis, whereas SPSS was employed for advanced statistical analysis and model construction.

3.2. Variable selection

Reverse age hierarchy management.

This research explores the impact of a CEO being younger relative to other executives on corporate performance. The inverse age relationship variable (Sd) is computed in the following manner: First, rank all executives in ascending order of age. Then, record the annual age rank of the CEO. Finally, divide the CEO's rank by the total number of executives. A smaller resulting ratio implies that the CEO is younger compared to their peers, signifying a more pronounced inverse age hierarchy, while a larger ratio suggests an older CEO and weaker inverse relationship.

(1) Enterprise performance

The economic implications of this research transcend mere profitability, encompassing aspects such as the enhancement of future development capabilities, operational efficiency, brand value, and corporate reputation. In this study, return on assets (ROA), calculated as net profit divided by total assets, is adopted as the primary performance metric. For robustness checks, basic earnings per share is utilized as an alternative measure.

(2) Control variables

Consistent with prior research, control variables include CEO characteristics: age (ceoage), gender (1=male), education level (degree), and enterprise growth ratio as shown in table 1. Other enterprise-level controls are implemented per established methodologies.

Table 1: Main variable definitions

Types of variables	Variable name	Variable symbol	variable declaration
Explained variable	Return on total assets	ROA	The net profit of the business divided by the total assets of the business.
Explaining variable	Inverse age relationship between superiors and subordinates	Sd	The age ranking of ceos divided by the total number of executives.
Control variable	The CEO's actual age	ceoage	The age of the CEO in the annual range of the sample
	CEO education	Degree	The data in the CSMAR database is used as the standard.
	Enterprise growth	Growth	Current operating income is subtracted from last year's operating income and then divided into last year's operating income

3.3. Model design

In order to test the influence of the upper and lower reverse age relationship on enterprise performance, the following regression model is constructed:

$$ROA_{i,t} = \beta_1 + \beta_2 Sd_{i,t} + \beta_3 CEOage_{i,t} + \beta_4 gender_{i,t} + \beta_5 degree_{i,t} + \beta_6 Growth_{i,t} + \varepsilon_{i,t} \quad (1)$$

Among them, $ROA_{i,t}$ represents the return on equity of company i in the t year, Sd represents the reverse age relationship between the upper and lower levels, and the other variables are the control variables mentioned above. If the estimated coefficient of Sd is significantly negative, that is, $\beta_2 < 0$, the reverse age relationship is positively correlated with the enterprise performance; if the estimated coefficient of Sd is significantly positive, that is, $\beta_2 > 0$, the reverse age relationship is negatively correlated with the enterprise performance.

3.4. Empirical results

As presented in Table 2, the average age of CEOs in the sample enterprises is 49.04, with a minimum value of 32 and a maximum value of 65, which indicates substantial age variation. Moreover, 93.5% of the CEOs are male. The management reverse age relationship variable SD has an average value of 0.679, ranging from 0.111 to 1, mirroring the prevalent age inversion patterns between executives and subordinates in Chinese companies.

Table 2: Descriptive statistics of variables

Variable	Sample size	Mean value	Standard deviation	Minimum	Maximum
ROA	10,899	0.0356	0.0716	-0.349	0.187
Sd	10,899	0.679	0.266	0.111	1
Growth	8,716	0.234	1.588	-0.997	84.99
MSR	10,414	7.055	13.06	0	80.01
gender	10,899	0.935	0.246	0	1
degree	10,899	3.728	1.312	1	7
CEOage	10,899	49.04	6.493	32	65

4. Regression analysis

4.1. Inverse age relationship and firm performance

Table 3 presents OLS regression results between reverse age and enterprise performance. Columns (1)-(2) display the univariate and controlled - variable OLS regression outcomes. The coefficient of the (Sd) variable remains significantly positive at the 1% level prior to regression, signifying that an increment in the Sd variable attenuates the reverse age impact on enterprise performance. This finding indicates that managing the reverse age relationship between superiors and subordinates impedes performance enhancement, thus validating research hypothesis A2.

Table 3: Inverse age relationship and firm performance

Variable	Enterprise performance 1	Enterprise performance 2
Sd_i	0.018*** (-6.84)	0.011*** (-2.87)
$age_{i,t}$		0 (-0.20)
$Growth_{i,t}$		0.004** (-2)
$MSR_{i,t}$		0.001*** (-8.34)
$gender_{i,t}$		0.003

Table 3: (continued).

		(-0.83)
degree _{i,t}		0
		(-0.29)
CEOage _{i,t}		0
		(-0.25)
Intercept term	0.023***	-0.306***
	(-11.57)	(- 10.76)
Industry and year	control	control
Sample capacity	10899	10899
R-squared	0.0045	0.2484

4.2. Actual Age of CEO

Young CEOs initially lack industry recognition, prioritizing long-term career development. Low authority in teams heightens their urgency to prove themselves under reverse age dynamics, causing performance declines. As CEOs mature, focus shifts to sustained operational results. Reduced career sensitivity allows seasoned CEOs to adjust risk preferences and leverage experience, easing internal competition. This reverses negative impacts of reverse age relationships, making team authority an asset.

This competition diminishes. To validate this, the study adds interaction term $Sd \times CEOage_{i,t}$ to model (1), creating model (2):

$$ROA_{i,t} = \beta_1 + \beta_2 Sd_{i,t} + \beta_3 Sd \times CEOage_{i,t} + \beta_4 CEOage_{i,t} + \beta_5 gender_{i,t} + \beta_6 degree_{i,t} + \beta_7 Growth_{i,t} + \varepsilon_{i,t} \quad (2)$$

Table 4 columns (1)-(2) show interaction term coefficients negative and significant at 1% level. Reverse age relationships inhibit performance improvements, indicating mature CEOs mitigate crisis responses, thus suppressing the effect.

Table 4: Moderating effect of CEO's chronological age

Variable	Enterprise performance 1	Enterprise performance 2
sd _{i, t}	0.089***	0.066***
	-4.47	-3.11
sd * ceoage _{i, t}	-0.002***	-0.001***
	(-3.70)	(-2.68)
ceoage _{i, t}	0.001***	0.001
	-3.36	-0.66
age _{i, t}		0
		(-0.08)
Growth _{i, t}		0.004**
		-2
MsR _{i, t}		0.001***
		-8.29
gender _{i, t}		0.003
		-0.84

5. Robustness test

We tested the main hypothesis's robustness through variable replacement and lagged regressions. Using basic EPS as the dependent variable maintained all coefficients' significance, consistent with prior findings. Lagged regression results retained 1% significance.

According to table 5, the table presents OLS regression results on inverse age relationships and basic EPS. Columns (1)-(2) show univariate OLS results with control variables included.

Significantly positive coefficients for Sd (inverse relationship variable) at 1% level indicate enterprise performance increases with Sd . However, higher Sd reflects weaker inverse age relationships, confirming hypothesis A2 that strengthened inverse age relationships hinder performance.

Table 5: Regression Results of Robustness Test for Inverse Age Relationship and Basic Earnings Per Share

variable	(1) Basic earnings per share	(2) Basic earnings per share
$Sd_{i,t}$	0.105*** (4.09)	0.131*** (3.45)
$age_{i,t}$		0.001 (0.04)
$Growth_{i,t}$		0.034** (2.02)
$MSR_{i,t}$		0.005*** (8.27)
$gendeT_{i,t}$		0.029 (0.91)
$degTee_{i,t}$		-0.001 (-0.14)
$ceoage_{i,t}$		-0.002 (-0.11)
Intercept term	0.267*** (14.16)	-3.587*** (-14.61)
Industry, Year	control	control
Sample size	10899	8306
R-squared	0.0045	0.2484

Early-career managers lack experience and market recognition, prioritizing long-term career growth. Young CEOs focus on establishing authority, affecting management behavior. Reverse age hierarchies harm performance through authority challenges. Later-stage CEOs gain external validation and shift to long-term results. Experience leads to adjusted risk preferences, reduced team competition, and strengthened authority, diminishing reverse age dynamics' performance impact.

According to table 6, regression results show the $Sd \times CEOage_i$ interaction term's coefficient is significantly negative. As CEO age increases, it weakens the reverse age hierarchy's negative effect on corporate performance. This suggests mature-stage CEOs ease reactions to authority challenges, weakening previous effects.

Table 6: Interaction Effect Analysis of Inverse Age Relationship and CEO's Actual Age on Corporate Performance

Variable	EPS
Sd	0.680*** (3.37)
$Sd*ceoage$	0.012*** (-2.76)
$ceoage$	0.005 (0.28)

Table 6: (continued).

Growth	0.034** (2.03)
MSR	0.005*** (8.24)
degree	-0.002 (-0.31)
gender	0.030 (0.92)
Intercept term	-3.919*** (-14.50)
Industry, Year	control
Sample size	8306
R-squared	0.2351

To enhance research robustness, this study employs lagged regression to analyze the impact of reverse age relationships between superiors and subordinates on corporate performance. According to table 7, the proxy variable Sd for this relationship is lagged by one period. Results show Sd coefficients are significant at the 1% level, indicating a lagged effect. This suggests changes in decision-making behavior from such relationships continue impacting performance in subsequent periods, supporting previous conclusions' robustness.

Table 7: Lagged Regression Analysis of the Impact of Inverse Age Relationship on Corporate Performance

variable	(1) ROA	(2) ROA
L.Sd	0.016***	0.014***
age		(14.93)
		0.002**
		(2.47)
Growth		(-25.26)
		0.000
MSR		0.001***
gender		(9.78)
		0.002
degree		-0.000
		(-0.20)
ceoage		-0.002***
		(-2.65)
Intercept term	0.029*** (15.23)	(-2.47)-0.249*** (-8.74)
Industry, Year	control	control
Sample size	8716	8306

6. Conclusion

The results firmly establish that the inverse age relationship between superiors and subordinates exerts a negative influence on firm performance. This can be largely ascribed to the weakening of CEO authority within such age - inverted management frameworks. Furthermore, the analysis discloses that the negative impact is more conspicuous when the CEO is younger and male. These

research findings offer invaluable insights into the ways in which age - related dynamics within executive teams can impact corporate performance outcomes.

However, this study also has certain limitations. The sample was limited to Chinese A - share listed companies, which may restrict the generalizability of the findings to other contexts. Additionally, while the study focused on CEO authority and R&D mediation, other potential factors such as corporate culture and industry - specific characteristics were not extensively explored.

For future research, it would be beneficial to expand the sample to include companies from different regions and industries, enhancing the representativeness and applicability of the results. Furthermore, incorporating additional mediating and moderating variables could provide a more comprehensive understanding of the complex relationship between managerial age dynamics and firm performance. This will not only enrich the existing theoretical framework but also offer more practical guidance for enterprises in optimizing their management team configurations and leveraging the strengths of both young and experienced managers.

References

- [1] Wei Liqun, Wang Zhihui. *Empirical study on the characteristics of senior executives and corporate performance of Listed Companies in China* [J]. *Nankai Management Review*, 2002, (04): 16-22
- [2] Zhang Ping, *a study on the relationship between senior management team heterogeneity and enterprise performance*. *Management Review*, 2006 (5): 54-61.
- [3] Wang Daoping, Chen Jia. *The impact of executive team heterogeneity on corporate performance was studied clearly* [J]. *Modern Finance*, 2004 (11): 58-62.
- [4] Child, J. "Managerial and Organizational Factors Associated with Company Performance" [J], *Journal of Management Study*, 1974, (11): 13-27.
- [5] Dechow, Patricia M., Sloan, Richard G. "Executive Incentives and the Horizon Problem" [J], *Journal of Accounting and Economics*, 1991, (14): 51-89.
- [6] Wiersema M F, Bantel K A. *Top Management Team Demography and Corporate Strategic Change* [J]. *Academy of Management Journal*, 1992, (35): 91-121.
- [7] Hambrick, D.C., P.A. Mason. *Upper echelons: The organization as a reflection of its top managers* [J]. *The Academy of Management Review*, 1984, 9(2): 193-206
- [8] CARPENTER, GELETKANYCZ, SANDERS. *Upper Echelons Research Revisited: Antecedents, Elements, and Consequences of Top Management Team Composition* [J]. *Journal of Management*, 2004(30): 749-778.
- [9] Li Yan, Qin Yihu, Zhang Xiaofei. *Enterprise property rights, background characteristics of managers and investment efficiency* [J]. *Manage World* 2011 (1): 135-144