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ABSTRACT

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Keywords: managerial overconfidence; cash holdings; internal control.

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Keywords: managerial overconfidence; cash holdings; internal control.

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I. INTRODUCTION

The financial crisis had a significant influence on promoting public consciousness surrounding the importance of cash reserves. Both the emerging and developed markets have significant cash reserves. According to Zheng and Chen (2018), 10% is a reasonable cash-holding level in China, and Bo et al. (2024) illustrated that the mean and median value of cash holding in China are 18% and 13% respectively, which means that Chinese listed companies have a higher cash holding level.

The manager is central to the company's power and leadership. Managers are responsible for strategic planning and organizational decision making (Sheikh, 2018); and their psychological bias impact their behavior (Bo & Li, 2024). These ideas assume that individuals are rational and disregard cognitive biases. However, the current psychological literature indicates that people are overconfident in their knowledge and abilities (Larwood et al., 1977; Heaton, 2002), which leads to self-attribution, control and knowledge illusion, and overly optimistic (Bo et al., 2024). Moreover, overconfident managers are likely to be hired, retained, or promoted. Generally, people who apply for management positions are more confident and optimistic. Companies that hire managers tend to believe that overconfident and excessively optimistic candidates may have higher ability due to capital market asymmetric information (Gervais et al., 2003). Goel and

Thakor (2008) suggested that overconfident managers are more likely to be promoted to the CEO. In addition, owing to the role of self-attribution bias, enterprise managers think that their success is mainly due to their ability, which leads to an overconfidence degree (Gervais et al., 2011).

Additionally, according to Ali and Tauni (2021), Chinese managers may be more overconfident. First, culture is the main body of traditional Chinese culture, advocating the hierarchical idea and emphasizing the importance of authority in Chinese interpersonal relations, making enterprise managers vulnerable to "control illusions," which developed a self-assured cognitive bias (Zheng & Chen, 2018). Secondly, China's unique transforming economic environment has shaped several "godfather-level" state-owned enterprise leaders and private enterprise founders, and their pivotal role in entrepreneurship and business growth and continued success may strengthen their confidence in psychology, leading to knowledge and control illusions (Feng & Chen, 2020). Thirdly, flaws in internal governance and external supervision mechanisms assist Chinese enterprises in creating a suitable "soil" for managers' overconfidence (Jiang & Kim, 2020). Therefore, the proportion of overconfidence in Chinese-listed companies may be higher than that in foreign-listed companies because of the influence of the Confucian hierarchy and imperfect external governance mechanism (Jiang et al., 2009).

According to research on cash holdings, companies primarily build cash assets for preventive and agency motivations (Chen et al., 2020). While pecking order theory and agency theory lead to distinct objectives, which means that the preventive motive may result in agency issues. This is because excessive cash holdings give managers excessive discretion (Opler et al., 1999). Nevertheless, fluctuations in economic situations and business environments lead enterprises to retain cash assets for precautionary motivation rather than for agency motives (McLean, 2011). In addition, Bo and Li (2024) pointed that overconfident managers hold more cash to reduce external finance costs and grasp future good investment opportunities to show their ability and values.

In addition, an extensive and outdated banking industry primarily controls China's financial system. Additionally, the country has a developing but inefficient and unequal capital market (Chen et al., 2020). These problems result in expensive external financing. Because of the imperfect capital market and governance mechanisms in China, external financing and internal agency costs are both high for companies (Jebran et al., 2019). Therefore, do Chinese public companies reserve more cash from internal financing to defend against external financing constraints or satisfy personal interests? What factors contribute to the high cash holding level—agency issues or precautionary motives? This is a question that warrants an in-depth investigation. Moreover, managing liquidity is a crucial issue for many Chinese enterprises, especially when there is a possibility of economic downturns. However, a higher cash holding level may result in agency problems for enterprises in real-world operations. This institutional context provides a distinctive opportunity to analyse the influence of efficient internal controls on cash management. As a result, China's unique background provides an incentive for assessing the effectiveness of internal controls in enhancing cash management except to considering the scope and objectives of these controls.

However, a series of problems cannot be solved. Firstly, most researchers mix the managers overconfidence and over-optimism into one concept. Overconfidence is a cognitive bias generated by an individual's self-evaluation emphasizing the self-assessment of their abilities, and the objects of the assessment are themselves (Karki et al., 2024). Over-optimism mainly refers to the individual's cognitive bias regarding the external environment and events, stressing the individual's expectation of positive results or conditions, and the objects of the assessment are external events and environments (Kambourova & Stam, 2017). Therefore, alleviating the managers' overconfidence should focus on improving internal control and information transparency,

rather than mainly focus on external economic environmental uncertainty and policy. Secondly, the results about the association between high-quality internal control and cash holdings are inconsistent. On the one hand, some scholars pointed that that internal control negatively related with cash holdings that based on the agency theory (Chen et al., 2020). On the other hand, some scholars believe that the higher level of the internal control, the higher the cash holdings (Xiong et al., 2021), and its theoretical basis mainly lies in two aspects: (1) reducing the irrational behavior of management and (2) defensing on plunder risks. Therefore, the impact of high-quality internal control on overconfidence cash holding is essential for Chinese listed companies. Thirdly, current research most focus on internal control and cash holding value (Anderson, 2022), internal control and corporate resource (Gao & Jia, 2016), corporate performance (Magerakis & Tzelepis, 2023; Yun et al., 2021) or corporate internal control as the moderating variable to check the relationship between risk management and cash holdings (Chen et al., 2020), relation trading and corporate cash holding (Lin et al., 2017) and so on. This means there is rarely research pay more attention to the moderating effects of managers' overconfidence and internal control on cash holdings. However, high-quality internal controls effectively reduce information asymmetry and cognitive bias for managers, which is important to alleviate managers' overconfidence and improve cash use efficiency for enterprises.

This paper points out that managers' overconfidence is positively associated with cash holdings. Moreover, the moderating effect of internal controls mitigate the positive relationship between managers' overconfidence and cash holdings. Multiple rigorous tests prove the reliability and consistency of the empirical findings. The Fix Effect Model as the base regression test, and robustness test involves GMM regression to mitigate endogenous problems.

This study presents a new research perspective and enriches the research on cash holdings by distinguishing managers' overconfidence and over-optimism and connecting internal control to alleviate managers' cognitive bias. Although numerous studies have been dedicated to the subject of internal controls or managers' overconfidence on cash holdings, there is a dearth of research explaining why managers' cognitive bias leads them to hold more cash. Hence, this research not only enhances the understanding of economic repercussions, but also contributes to the concern for the impact of internal governance mechanisms on overconfidence cash holding of Chinese listed companies.

II. LITERATURE REVIEW

Chen et al. (2020) illustrate that managers' cognitive biases can directly affect corporate behavior, and the impact of cognitive bias on manager overconfidence is particularly significant. "Overconfidence" comes from research in cognitive psychology, which is a common psychological phenomenon. Studies have shown that people are not completely rational, and they are self-centered. Moreover, people always believe in their own cognition and judgment, and are more overconfident in their own knowledge and ability. Generally, people's decisions, beliefs, and preferences often exhibit systematic biases and overconfidence (Kahneman et al., 1982). Weinstein (1980) pointed out that people generally show overconfidence in making judgments, particularly in groups such as entrepreneurs and managers. Ben-David et al. (2007) showed that managers' overconfidence bias tends to raise large amounts of money for investment activities. Heaton (2002) found that overconfident managers tend to use internal corporate funds. This means that overconfident managers would reduce external financing cost and grasp future good investment opportunities through preparing enough internal cash.

Zheng and Chen (2018) illustrate that the degree of managers' overconfidence in China is more serious than that in foreign enterprises because of problems such as the prominent status of authority in interpersonal relationships, special transition economy environment, and imperfection of enterprise internal and external mechanisms. They also found that M&A behavior carried out by overconfident managers eventually

damages the value of the enterprise (Yu et al., 2006; Malmendier & Tate, 2008; Hribar & Yang, 2016).

This study investigates the correlation between managers' overconfidence and cash holding levels. However, most studies apply agency theory and pecking order theory to explain the above relationship, and assume that people are rational and disregard cognitive biases. However, the agency problem can be alleviated if managers are overconfident (Dong, 2019). This study is based on psychology theory and uses overconfidence theory to explain why overconfident managers hold more cash. First, the agency problem can be mitigated if managers are overconfident (Xing, 2023). This is because overconfident managers rely on shareholder loyalty to shareholders (Heaton, 2002). A high level of overconfidence can motivate managers to work harder and alleviate agency problems to a certain extent (Gervais et al., 2003). Second, overconfident managers overestimate their abilities and underestimate future risks, leading to cognitive bias (Bo et al., 2024). Thirdly, overconfident managers are willing to hold more cash to grasp future investment opportunities and provide stable and sustainable funding support for more R&D investments. Fourthly, overconfident managers overestimate future investment return and underestimate future risks and uncertainty. Therefore, overconfident managers tend to hold more cash for internal financing because they want to reduce external financing costs and grasp future good investment opportunities (Zheng & Chen, 2018). Consequently, overconfident managers tend to hold more cash in business operations. Based on the above analysis, Hypothesis 1 can be expressed as follows:

H1: managers' overconfidence has the positive correlation with cash holdings.

This study uses internal control as a moderating variable to investigate the influence of the above correlation. High-quality internal controls can mitigate information asymmetry through effective institutional arrangements that enhance the supervision of enterprise decision-making and implementation processes. In addition, high-quality internal control enables managers to be more cautious, repeatedly assess the consequences of decision making, and constantly correct their perceptions of self-reliance, thereby reducing their overconfidence. Constrained and supervising managers' overconfidence behavior through effective internal control can promote optimization of enterprise resource allocation. In scholars' studies, Chen et al. (2021) pointed that effective corporate governance can mitigate the problem of excessive investment resulting from overconfident managers. According to Sani and Chaharmahalie (2012), effective internal controls can mitigate the adverse effects of overconfident managers on accounting. Zheng and Chen (2018) demonstrated that effective internal controls can monitor and discipline managers' behaviors. Managers overestimate their decision-making abilities, especially when they have considerable power and influence (Moore & Kim, 2003). Nevertheless, managers' overconfidence can be reduced when their decision-making and control powers are limited (Banerjee et al. 2015). Effective internal controls can encourage managers to exercise greater prudence in their decision-making processes and strengthen stakeholder involvement and supervision, reducing their decision-making and control power while correcting cognitive deviations that caused by overconfidence. In other words, effective internal controls reduce overconfident managers holding excess cash (Chen et al., 2020). Therefore, Hypothesis 2 was as follows:

H2: Effective internal control mitigates overconfident managers hold excessive cash.

III. DATA AND METHODS

3.1 Sample Construction

This study uses data from A-share Chinese listed firms in Shanghai and Shenzhen between 2010 and 2022. The data were sourced from the CSMAR database and analyzed using Stata statistical software. The observation number is 46831, which does not include ST companies, and B and H share Chinese List companies.

3.2 Research models and variable measurements

Regression model 1 was constructed to investigate the correlation between managers' overconfidence and cash holdings. Model 2 assesses the impact of internal controls on managers' overconfidence in their cash holdings. Model 3 assessed the impact of product market competition on this relationship.

MODEL 1:

$$CH_{it} = \beta_0 + \beta_1 OC_{it} + \sum \beta_{it} CV_{it} + \varepsilon_{it} \quad (1)$$

Model 2:

$$CH_{it} = \beta_0 + \beta_1 OC_{it} + \beta_2 HIC_{it} + \beta_3 OC_{it} * HIC_{it} + \sum \beta_{it} CV_{it} + \varepsilon_{it} \quad (2)$$

In Models 1 And 2, Cash Holdings Denote Corporate Cash Holding. Oc Denotes Manager Overconfidence, Using Shareholding And Earnings Changes As A Measure To Denote Managers' Overconfidence, Which Is Measured Using The Changes In Shareholding Growth Rate Minus The Difference In Earnings Per Share Growth To Measure Managers' Overconfidence Level (Wang, 2021). This Index Not Only Reflects The Confidence And Conservative Characteristics Of Managers From The Direction But Also Quantifies The Manager Confidence Index Through The Deviation Of Specific Values. In Addition, Hic Denotes High-Quality Internal Control. ε_{It} Is The Error Term.

Moderating Variable Is Hic, Hic Is The Internal Control Index. According To The Yang And Wang (2020), Chen Et Al. (2017) And Chen Et Al. (2020) Measures Of Internal Control Index, The Model Is Measured As Follows. In The Model (1). W Represents The Weight Of Each Index For Internal Control Of Listed Companies; Strategy Represents The Strategic Index Of Listed Companies; Operation Represents The Operational Index Of Listed Companies; Reporting Represents The Reporting Index Of Listed Companies; Compliance Represents The Compliance Index Of Listed Companies; Asset Safe Represents The Asset Security Index Of Listed Companies; Correction Represents The Correction Index Of Listed Companies. When The Internal Control Index Exceeds The Sample Year's Median Value, Hic Takes One; When It Does Not, Hic Takes Zero.

$$HIC = \sum w_k * Strategy_k + \sum w_k * Operation_k + \sum w_k * \mathrm{Re}porting_k + \sum w_k * Compliance_k - w * Correction \quad (3)$$

Table 1: Variables definition

Variable name	Variable symbol	Variable meaning
Cash holding	CH	(Monetary funds + trading financial assets / Total assets)
Managerial overconfidence	OC	With holding growth rate minus the difference of earnings per share growth to measure managers overconfidence level

Internal control	HIC	If the internal control index is higher than the median industry of the sample year, HIC takes 1, otherwise, HIC takes 0
Customer concentration	CC	According to the "sales revenue of the top five customers in the proportion of the total sales revenue" disclosed in the annual reports of the listed companies
Managerial Ownership	MO	Managerial ownership is the ratio of ownership by executive directors to the number of shares outstanding at the end of fiscal year.
Firm size (CNY-100 million)	Size	Natural logarithm of the total assets at the end of the year
Dividend payment	Div	Dividend payment is taking 1, otherwise, Div takes 0
Duality of COB and CEO	Du	If the chairman and the general manager are held by the same person, the value is 1. Otherwise, 0
Enterprise nature	State	SOE is1. Non-SOE value 0

IV. RESULTS OF THE EMPIRICAL ANALYSIS

4.1 Statistics analysis

Table 2 indicates that the variable contained 46831 observations. The mean value of cash holdings was 17.8%. The mean value of OC is 0.469, which means that managerial overconfidence is present in nearly 50% of the managers.

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std.dev.	Min	Max
CH	46,831	0.178	0.123	0.00136	0.980
OC	46,831	0.469	0.147	0.0924	1
HIC	46,831	0.948	0.223	0	1
Du	46,831	0.162	0.369	0	1
Div	46,831	0.709	0.454	0	1
Size	46,831	22.91	1.443	17.64	28.61
State	46,831	0.698	0.459	0	1
CC	46,831	27.11	21.16	0	157.9
MO	46,831	0.186	0.389	0	1

Note: Table 1 provides comprehensive definitions for all variables utilised in this paper.

4.2 Pearson's correlation analysis

Pearson's correlation coefficient was used to evaluate the relationships between the variables. Table 3 presents the associations between the variables in the sample. The main purpose of the Pearson correlation test was to determine whether multicollinearity existed among independent variables. Multicollinearity difficulties occur when correlation coefficients exceed 0.8 (Gujarati and Porter, 2009). Nevertheless, the correlation coefficients for the variables vary between -0.156 and 0.138, which is below the limit of 0.8, as indicated in Table 3. The results indicate that there was no multicollinearity problem in the present investigation.

Table 3: Correlation Matrix of the Pearson

	CH	OC	HIC	Du	Div	Size	State	CC	MO
CH	1								
OC	0.089***	1							
HIC	0.034***	-0.028**	1						
Du	0.029**	0.081***	0.045***	1					
Div	0.138***	-0.131***	0.076***	-0.00300	1				
Size	-0.156***	-0.238***	0.057***	-0.116***	0.232***	1			
State	-0.048***	-0.179***	0.00600	-0.253***	0.072***	0.223***	1		
CC	-0.0110	0.109***	-0.00800	-0.0180	-0.120***	-0.187***	-0.00800	1	
MO	-0.00900	-0.036***	0.0160	0.00800	0.049***	0.077***	-0.081***	-0.026**	1

Note: Table 1 provides comprehensive definitions for all variables in this paper.

4.3 Empirical results

Table 4 displays the link between managers' overconfidence and cash holdings and examines the influence of internal controls and product market competition on this correlation. The regression analysis uses the Fixed Effects Model (FEM) to investigate the correlation between managers' overconfidence and cash holdings, as shown in Column (1). Columns (2) present the outcomes of the moderating variable. The regression analysis in column (1) demonstrates a statistically significant and positive correlation at the 1% level, with a coefficient of 0.042. This finding illustrates that a one-unit rise in managerial overconfidence results in a 0.042-unit increase in cash holdings. This is because if overconfident managers want to show their abilities, they should ensure they have sufficient funds to seize investment opportunities and achieve higher returns. In addition, overconfident managers believe that the current enterprise is undervalued, external financing costs are higher, and they tend to undertake internal financing. Therefore, managers tend to hold more cash for internal financing, which can reduce their continuous dependence on the capital market, and do not need to provide information to capital investment projects. Therefore, the results verify a direct positive correlation between managerial overconfidence and amount of cash.

Column (2) shows the influence of internal controls on the relationship between managerial overconfidence and cash holdings. The coefficient is -0.076 at the 5% level. The result shows a negative interaction effect between internal control and managers' overconfidence (OC*HIC), which is consistent with H2. This result indicates that the positive effect of managerial overconfidence on cash holdings may diminish in regions with more effective internal controls. Thus, effective internal controls can mitigate overconfident managers holding excess cash and assist them in making reasonable decisions in their daily operations. The results suggest that stronger internal control measures reduce overconfident managers' tendency to retain excessive cash. Companies mitigate cash dissipation from insider trading, alleviate the risk of failure from operational losses, and incur higher borrowing expenses. These findings strongly suggest that high-quality internal controls are internal risk-management mechanisms for cash holdings.

Table 4: Regression Test between Managers' overconfidence and Cash Holdings

VARIABLES	OC	OC*HIC
	CH	CH
OC	0.042***	0.114***
	(3.64)	(3.59)
HIC		0.054***
		(3.30)
OC*HIC		-0.076**
		(-2.40)
Du	0.001	-0.000
	(0.16)	(-0.03)
Div	0.025***	0.024***
	(7.97)	(7.88)
Size	-0.016***	-0.016***
	(-5.68)	(-5.63)
State	-0.026***	-0.026***
	(-5.66)	(-5.70)
CC	0.000***	0.000***
	(2.90)	(2.94)
MO	-0.001	-0.001
	(-0.32)	(-0.28)
Constant	0.477***	0.427***
	(6.52)	(5.71)
Observations	46,831	46,831
R-squared	0.086	0.088
Number of code	4922	4922
ind FE	YES	YES
Year FE	YES	YES

*Note: t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1. Table 1 provides comprehensive definitions of all the variables utilized in this study.*

4.4 Endogenous problem test

These findings may be affected by endogeneity problem. Therefore, this study uses GMM to mitigate the endogeneity problem and as a robust test method to support the main regression results. From table 5, it can be seen that the GMM regression shows a positive relationship for OC and CH at the 1% level with a coefficient of 0.158. In addition, OC*HIC indicates a negative relationship, with a coefficient of -0.441 at the 5% level. These results indicate that effective internal controls can mitigate overconfident managers holding excess cash, consistent with the base regression results. Consequently, regardless of high-quality internal controls can alleviate managers' overconfidence by addressing the agency problem and information asymmetry, allowing overconfident managers to make irrational and reasonable cash holding decisions.

Table 5: The regression for GMM

VARIABLES	OC	OC*HIC
	CH	CH
L.CH	0.454***	0.505***
	(8.04)	(8.53)
OC	0.158***	0.528**
	(3.20)	(2.34)
OC*HIC		-0.441**
		(-2.09)
HIC		0.220**
		(2.06)
Du	-0.001	-0.028
	(-0.09)	(-0.95)
Div	0.009**	0.019*
	(2.24)	(1.66)
Size	0.007*	0.007*
	(1.66)	(1.78)
State	0.027**	0.055***
	(2.00)	(2.95)
CC	0.000	-0.000
	(0.93)	(-0.28)
MO	-0.007	-0.008
	(-0.62)	(-0.57)
Constant	-0.168*	-0.394**
	(-1.72)	(-2.57)
Observations	5,180	5,180
Number of code	4839	4839
ar1	-7.635	-7.993
ar1p	0	0
ar2	0.482	0.414
ar2p	0.630	0.679
hansen	261.9	123.9
hansenp	0.119	0.227
N	45180	45180

*Note: z-statistics are given in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Table 1 provides comprehensive definitions of all the variables utilized in this study.*

4.5 Heterogeneity analysis

Effective internal controls improve information transparency. However, combining increased information transparency with effective incentives for executives is essential. This is because competitive market governance is driven by executive effort and decisions. If shareholders use adequate information to identify executives' abilities and efforts but do not provide them with proper incentives and rewards, executives will be pushed to leave the company or seek recompense through slackness.

The unique history of China's economic development has resulted in large differences in corporate governance between state-owned enterprises (SOEs) and non-SOEs. The executive incentive mechanisms of state-owned enterprises are less efficient than those of non-state-owned enterprises are. State-owned enterprise executives rely on executive appointments from senior authorities, weakening the incentive of competitors within enterprises to promote performance competition and restricting internal incentives for promotion. In addition, state-owned enterprises' increased social responsibility is the main tool for implementing macro-control and industrial policies, which are difficult to measure accurately. Although non-state enterprises primarily focus on corporate performance, the performance characteristics that facilitate the evaluation of executives' incentive mechanisms are relatively effective. This further weakens the incentive effect of the rewards on state-owned enterprise executives. Finally, state-owned enterprises have fewer financing constraints than non-SOEs. This is because state-owned enterprises with "natural blood" and more political ties are more likely to have access to government support and bank loans than private enterprises. Based on the above analysis, we propose the following hypothesis: internal control has a significant impact on the relationship between managerial overconfidence and cash holdings for non-state-owned enterprises.

Table 6 shows the results of the heterogeneity analysis of the nature of enterprises. It can be finding that effective internal controls have a significant correlation for the non-state-owned enterprises.

The moderating effects of OC*HIC shows a coefficient of -0.255at the 1% level. The findings indicate that strong internal control measures significantly reduce this positive association. Compared to state-owned enterprises, non-state-owned enterprises play a crucial role in reducing the correlation between managerial overconfidence and cash holdings.

Table 6: Heterogeneity analysis for nature of enterprises

VARIABLES	OC*HIC	
	State=1	State=0
	CH	CH
OC	0.048	0.304***
	(1.36)	(4.65)
HIC	0.022	0.169***
	(1.26)	(4.85)
OC*HIC	-0.037	-0.255***
	(-1.05)	(-3.95)
Du	0.006	-0.001
	(1.32)	(-0.10)
Div	0.012***	0.035***
	(3.56)	(5.69)
Size	-0.012***	-0.012**
	(-3.52)	(-2.07)
CC	0.000***	0.000
	(2.58)	(1.06)
MO	0.002	-0.002
	(0.59)	(-0.30)
Constant	0.328***	0.575***

	(3.66)	(3.44)
Observations	4,771	2,060
R-squared	0.107	0.157
Number of code	24777	24346
ind FE	YES	YES
Year FE	YES	YES

*Note: t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1. Table 1 provides comprehensive definitions of all the variables utilized in this study.*

V. CONCLUSION AND CONTRIBUTION

This study examines whether overconfident managers affect an enterprise's cash holdings. In addition, this study connects internal governance (internal control) to examine whether effective internal control mitigate the positive relationship above. The empirical findings support these predictions. The results illustrate that high-quality internal controls mitigate the relationship between manager overconfidence and cash holding levels. At the same time, the heterogeneity analysis of the nature of enterprises is shown in this study, which illustrates that high-quality internal control and fierce product market competition have a significant influence on non-own-state companies. This means that high-quality internal control can alleviate overconfident managers holding excess cash and help managers make rational cash holding decisions.

This study presents a new research perspective on managers' overconfidence and cash holding levels, and expands the literature review. Traditional finance research on enterprise cash holdings has assumed that managers are rational. This study focused on the irrational characteristics of overconfident managers. It examines how this characteristic affects corporate cash, and the mechanism that incorporates behavioral finance to enhance the interpretation of the findings. In addition, this study enhances the research on internal and external governance mechanisms.
Although there are numerous studies on corporate governance and cash holdings, research on the impact of internal governance factors on the correlation between managers' confidence and the currency reserves of enterprises is scarce. Hence, this research not only enhances the understanding of internal control in relation to economic repercussions, but also contributes to the concern for external governance mechanisms of Chinese listed companies. Third, it provides valuable guidance for establishing a cash holding strategy for Chinese listed companies.

This study's findings have important implications for listed Chinese companies. First, Companies should pay more attention to the influence of managers' irrational psychological characteristics on their decision making and improve the internal control mechanism. Overconfident managers' irrational psychological characteristics signifi-cantly affect company management. This study reminds companies to develop a scientific and rigorous internal control mechanism when making decisions, rather than trusting managerial decisions. Effective internal controls can limit managers' overconfidence and cognitive bias. Establishing an internal control mechanism for managers is essential for preventing the negative impact of overconfident managers on company management. On one hand, companies should punish managers who deliberately harm the interests of investors and shareholders because of their overconfidence. Companies must determine suitable and stable financing methods based on their operations and developments. Second, companies should rationally assess the purpose of their cash holdings. Managers who satisfy their private interests experience a reduced performance. Effective response to changes in the external financing environment can improve corporate performance. Enterprises should promptly evaluate changes in the external competitive environment, clarify the purpose of formulating corresponding cash holding plans, and improve the value of enterprise cash holdings.

Similar to other empirical studies, this study has several limitations. First, due to the availability and validity of the data, we chose shareholding and earning changes as a measure of managerial overconfidence. However, we did not construct an overconfidence indicator based on board members' personal characteristics. Future research could consider establishing a more accurate measurement system based on managers' gender, age, work experience, educational background, and tenure as well as more accurately studying the impact of managers' overconfidence on industry competitive pressure and corporate cash-holding relationships. Second, this study explored only the impact of managerial overconfidence on the cash holding level of Chinese listed companies. Further studies are needed on the impact of managerial overconfidence on corporate cash holdings in different industries.

Ethical Compliance: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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