VILNIUS TECH
Vilnius Gediminas Technical University

Journal of Business Economics and Management
ISSN 1611-1699 / eISSN 2029-4433
2023 Volume 24 Issue 5: 939–959
https://doi.org/10.3846/jbem.2023.20660

U-SHAPED RELATIONSHIP BETWEEN MANAGERIAL HERD BEHAVIOR AND CORPORATE FINANCIALIZATION WITH THE MODERATING EFFECT OF CORPORATE GOVERNANCE: EVIDENCE FROM CHINA

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Received 28 May 2023; accepted 25 October 2023

Abstract. Based on behavioral finance theory, we discuss the influence of managers' herd behavior on corporate financialization from the perspective of managers' behavioral preferences. Empirical testing was conducted using data from nonfinancial listed firms on the Shanghai and Shenzhen A-shares from 2007 to 2021 and a U-shaped relationship was found between managerial herd behavior and corporate financialization. When managerial herd behavior is within an appropriate range, the increase in managerial herd behavior has a negative influence on corporate financialization. In contrast, excessive managerial herd behavior leads to excessive corporate financialization. Additionally, corporate governance has a weakening effect on this relationship. Heterogeneity analyses indicate significant disparities in the effect of managerial herd behavior on corporate financialization among enterprises with diverse ownership structures. Finally, corporate financialization and innovation investments have an inverted U-shaped relationship, and their relationship is moderated positively by management herd behavior. Our results have strong practical significance for fostering the balanced growth of the financial sector and the real economy.

Keywords: managerial herd behavior, information learning motivation, self-interest motivation, corporate financialization, internal corporate governance level, ownership structure, innovative investments.

JEL Classification: D22, G11, G32, G40.

Introduction

The structural contradiction between the financial market's rapid expansion and the real economy's sluggish growth has recently presented itself to China's macroeconomic development. There is an increasingly clear trend in China's economy "from real to virtual". A notable phenomenon is the tendency of an increasing number of real enterprises to deviate from their main businesses and allocate substantial financial assets through financial chan-

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nels. Thus, substantial funds flow to the virtual economic sector, which ultimately causes real enterprises to financialize. Corporate financialization is a microcosmic representation of an economy that is "from real to virtual", and excessive financialization can cause enterprises to rely too heavily on income from financial investments, which is not ideal for the growth and future value creation of their core businesses. This effect is particularly visible in the decline in the future performance of enterprises' main businesses (Du et al., 2017), a decrease in real investments (Akkemik & Özen, 2014; Tori & Onaran, 2018), and the inhibition of corporate innovation (Seo et al., 2012).

Scholars believe that corporate financialization has a dual influence on real enterprises. On the one hand, there is a "reservoir" impact associated with corporate financialization. A certain degree of corporate financialization can increase capital conversion efficiency, reduce corporate financial issues, and promote corporate industrial investments (Gehringer, 2013). On the other hand, there is a "crowding out" impact. Excessive financialization can have negative consequences, such as speculative behavior, which leads to funds flowing into the financial sector. This can potentially crowd out long-term investments in the industrial sector (Zheng et al., 2019). It is vital to investigate the factors that influence corporate financialization in order to essentially prevent and control excessive financialization, as well as to prevent and manage financial risks. This has significant practical significance for fostering the balanced growth of the financial and the real economy.

Corporate financialization is inevitably impacted by managerial behaviorbecause because managers are the dominant of investment choice. The literature on corporate financialization, however, rarely examines it from the viewpoint of managers' behavioral preferences and ignores the part that managers' herd behavior played in corporate financialization. Managerial herd behavior manifests as managers being driven by their herd mentality and ignoring proprietary information or their own judgment and instead choosing to follow and imitate the behavior of the majority of individuals in the market when making decisions (Bikhchandani et al., 1992). Unlike reputational herding, the core motivation of reputational herding lies in individuals imitating others' behavior to gain or maintain their own reputation (Graham, 1999; Prendergast & Stole, 1996; Roider & Voskort, 2016), while the motivation for managerial herding includes various factors such as reputation concerns, saving information costs, or avoiding responsibility (Bikhchandani et al., 1992; Demirer & Kutan, 2006; Hong et al., 2000; Jian & Lee, 2011). Managerial herd behavior includes a broader herd mentality, and the herd behavior of managers with different motivations may have different impacts on enterprise investment decisions. Driven by this psychological preference for herds, managers may be influenced by other corporate financialization behaviors when making investment decisions, which may affect their own corporate financialization level. In addition, because ownership and control are separated in corporations, there may be issues of agency and information asymmetry, resulting in stockholders and managers having competing interests. According to the literature, decisions about corporate investment can be significantly impacted by this conflicts of interest (Jiang & Kim, 2015; Stulz, 1990). The corporate governance mechanism is the main external constraint of managers' behavioral preferences. Through supervision and incentives, the corporate governance mechanism ensures that managers behave in a way that maximizes the company's worth and the interests of stockholders. Managers will respond

significantly differently in businesses with diverse corporate governance structures (Zhang et al., 2023). Therefore, we consider whether managerial herd behavior affects corporate financialization. If so, does corporate governance have a moderating effect on this impact? This is the primary focus of this research.

To answer the above problems, we use data from Chinese listed business from 2007 to 2021 to explore the influence mechanism of managerial herd behavior on corporate financialization. First, we discover a U-shaped link between managerial herd behavior and corporate financialization. After controlling for robust standard errors with propensity score matching, lagging variables, employing alternative measures, replacing the sample interval, and changing the samples, the result remains robust. Second, the relationship between managerial herd behavior and corporate financialization is moderated by corporate governance. Finally, further study demonstrates that the influence of managerial herd behavior on corporate financialization performs differently depending on the ownership structure. The inverted U-shaped connection between innovation investments and corporate financialization is positively regulated by managerial herd behavior.

We make the following literary contributions. First, from the perspective of managers' herd psychology, we discuss the underlying factors of corporate financialization. Few researchers have discovered that the perspective of managers' behavioral preferences may explain corporate financialization. Moreover, prior research on managers' herd behavior has mainly focused on irrational aspects while ignoring the rational aspects of managers' herd behavior. We consider the nonlinear impact of managerial herd behavior on corporate financialization.

Second, we investigate the moderating effect of corporate governance on the connection between managerial herd behavior and corporate financialization, which expands the existing analytical framework. Prior research has overlooked the contingency effect of internal and external environments on managers' behavioral preferences.

Finally, we investigate how various ownership structures affect the relationship between corporate financialization and managerial herd behavior. We further investigate how managerial herd behavior affects the connection between innovation investments and corporate financialization. This broadens the body of study regarding the connection between managerial herd behavior and corporate financialization.

The following is the design of this writing. Section 1 outlines the review of literature and proposes the research hypothesis. The research sample, variable design, and empirical model are all described in Section 2. Section 3 presents the empirical outcomes and robustness tests. Section 4 provides further analysis. The last section concludes this writing.

1. Literature review and hypothesis development

1.1. Literature review

1.1.1. Managerial herd behavior

Prior research has confirmed the existence of managers' herd behavior when making investment decisions. Investment decisions driven by such herd behavior can have negative effects

on industry performance as a whole, and managerial herd behavior can negatively affect corporate efficiency and lower firm value (Hirshleifer et al., 2004; Knyazeva et al., 2008). However, some scholars have found that managers can provide shareholders with a sense of security through rational herd investments, and herd behavior is positively connected with corporate performance (Bo et al., 2016).

Both irrational and rational considerations can driven managerial herd behavior; that is, herd behavior can be divided into imitation and learning. From the perspective of behavioral motivation, imitation is a phenomenon of blindly following the trend of "you invest and I invest" while ignoring one's rational judgment and irrational herd behavior that emphasizes the individual's behavioral psychology. Learning is the process of modifying one's decisions based on understanding investment information from other companies, known as rational herd behavior, which emphasizes the ability to learn from existing information and make independent judgments (Bikhchandani & Sharma, 2000; Lieberman & Asaba, 2006).

According to the literature, the following factors are primarily responsible for managerial herd behavior. First, scholars have discovered that reputation concerns are the reason for managerial herd behavior. When managers' investment decisions may negatively affect their reputation, to maintain their own reputation and career prospects, managers will choose to imitate the investment decisions of other managers (Cote & Goodstein, 1999; Jian & Lee, 2011). Second, based on the motivation of saving information costs, managers who lack information for making decisions are more tempted to take part in herd behavior. Due to information asymmetry and other reasons, decision-makers are unable to receive completely effective information. When the cost of receiving the necessary information is too high, managers tend to imitate the actions of other managers to cut costs associated with gathering and processing information (Bikhchandani et al., 1992; Demirer & Kutan, 2006; Devenow & Welch, 1996; Kameda & Nakanishi, 2003). Third, managers may choose to imitate other managers to avoid the responsibility of investment failure so that even if the investment fails, managers can still attribute the failure to others or market phenomena (Hong et al., 2000; Scharfstein & Stein, 1990). Fourth, based on the mechanism of instinctive behavior, people have an innate tendency to maintain consistency with group behavior (Budescu et al., 2003). Managers cannot completely avoid herd mentality, as herd behavior helps lessen the sense of loneliness and fear that may arise from deviating from the majority.

1.1.2. Corporate financialization

In essence, corporate financialization is an investment choice made by firms. Excessive corporate financialization causes enterprises' profits to depend on financial investments rather than the main business (Davis, 2018; Krippner, 2005), which may impede real-economy growth and even lead to major systemic financial risks.

The two primary facets of previous research on corporate financialization motivations are "speculative profit-seeking" and "preventive savings". First, "preventive savings" motivation, financial assets are allocated with the intention of preventive reserves. Enterprises increase their cash reserves by holding financial assets to alleviate financing constraints and reduce financial risks (Duchin et al., 2017; Hu et al., 2017). Second, "speculative profit-seeking" motivation, the purpose of allocating a large quantity of financial assets by firms is to maximize

profits. Companies tend to allocate larger amounts of financial assets at the expense of cutting industrial investments in order to pursue excess returns on financial assets because financial investments yield higher returns than industrial investments (Demir, 2009; Shu et al., 2020; Tori & Onaran, 2017). The distribution of financial assets has become a means for managers to manipulate earnings and adjust book profits (Barton, 2001; Lazonick, 2013; Shin & Zhao, 2013). The flexibility of financial assets in short-term returns and profit adjustments might provide managers with control interests. Managers choose to hold financial assets in respond to pressure from short-term performance evaluations (Du et al., 2017).

1.1.3. The influencing factors and consequences of corporate financialization

Scholars have mainly studied the elements influencing corporate financialization from two aspects: external environmental factors and the internal characteristics of companies. External environmental factors include the macroeconomic environment, economic operational cycle, industrial policy and economic policy uncertainty (Cao et al., 2022; Demir, 2009; Hu et al., 2017; Zhao & Su, 2022). The internal characteristics of companies mainly regard the executive. For example, the CEO's financial background and manager myopia both promote corporate financialization (Du et al., 2019; Zhu et al., 2023). Corporate financialization is significantly positively impacted by Controlling shareholders' financial background (Shi et al., 2021). In addition, scholars investigate the reasons behind corporate financialization, including corporate social responsibility, employee stock ownership plans, financing constraints, and ownership structure (Feng et al., 2022; Kornelakis & Gospel, 2018; Lei et al., 2022). According to Lei et al. (2022), private businesses have a greater propensity for financialized investment activity than state-owned firms. Kornelakis and Gospel (2018) find that salary differences within a company can affect its financialization. Feng et al. (2022) show that the financialization of businesses is significantly hampered by the implementation of employee stock ownership plans.

Businesses' strategic decisions will inevitably lead to corresponding economic consequences. There are many existing researches on the economic effects of company financialization, and various scholars have varying perspectives. The relevant literature mainly examines how corporate financialization affects enterprise innovation, fixed investment, and corporate performance (Du et al., 2017; Jin et al., 2022; Li & Wang, 2021; Seo et al., 2012). Seo et al. (2012) argue that corporate financialization inhibits corporate innovation. According to Li and Wang (2021), corporate financialization beyond a certain level may significantly promote firm R&D. According to Jin et al. (2022), fixed investment rates and corporate financialization are negatively correlated. According to Du et al. (2017), financialization harms the physical enterprises' primary business performance in the future. These findings confirm the "crowding out" and "reservoir" effects of corporate financialization.

Overall, little research has been done on corporate financialization from the standpoint of executive behavioral preferences. In the context of the increasingly serious phenomenon of excessive financialization, it is crucial to study the causes of enterprise financialization. Thus, clarifying the impact mechanism of managerial herd behavior on enterprise financialization has great theoretical and practical significance.

1.2. Hypothesis development

From the following two angles, we investigate the possible effects of managerial herd behavior on corporate financialization.

First, there is the "promoting effect" of managerial herd behavior. Based on the principal-agent theory, managers tend to imitate the investment behavior of others when faced with externally uncertain environmental factors because of self-interested motives. Such as maintaining reputation, avoiding responsibility, and comparing performance. To maintain their current reputation and avoid responsibility for decision-making errors, managers choose to align their investment decisions with the behavior of most decision-makers in the market (Narayanan, 1985; Stein, 1989). Within the framework of the mechanism for assessing relative performance, managers' performance depends on not only their efforts but also those of competitors. Managers' performance is acceptable if it does not fall below the industry average (Albuquerque, 2009). Thus, managerial herd behavior has become the optimal choice for securing personal interests. Faced with a sluggish market environment in the real economy, managers may choose to focus on short-term benefits, such as personal compensation and performance, driven by self-interested motives and leading to an increase in financial asset allocation. The herd behavior of managers who shirk responsibility may lead to companies missing out on good development opportunities (Zheng, 2002). Therefore, to maintain their reputations, shirk responsibility and compare performance, managers driven by self-interested motives tend to display irrational herd behavior, which may promote the corporate financialization.

Second, there is the "inhibitory effect" of managerial herd behavior. Information can play a crucial role in investment decisions. Decision-makers may engage in herd behavior if they overuse publicly available information from the industry (Knyazeva et al., 2008). The existence of information asymmetry in the real market might result in insufficient decision-making information for firms. Managers may obtain value-related information by referring to others decisions to save information acquisition and processing costs and rationally choose useful information. Whether a company chooses to invest its limited funds in financial assets depends on the manager's balance between short-term interests and the long-term value of the corporate. Based on information asymmetry theory, managerial herds are actually information following and aim to establish their reputations and enhance their recognition in industry and society (Zheng, 2002), which causes management to concentrate more on the firm long-term value. Managers decide to adopt investment behaviors that can improve the long-term value of corporate based on goals such as building a reputation and career progress, thereby lowering financial asset allocations. Excessive corporate financialization can squeeze out industrial investments and R&D innovation, thereby affecting the core competitiveness of enterprises, which can damage the company's value (Du et al., 2019). Consequently, managers' herd behavior is motivated by information following, which allows them to learn from existing information and make independent decisions. Thus, managers driven by information learning motivation tend to engage in rational herd behavior, which can partially inhibit enterprise financialization.

The impact of managerial herd behavior on corporate financialization can be seen to be not necessarily linear. When managerial herd behavior is below the threshold, it may have a negative impact on corporate financialization. The lower herd mentality weakens the motivation of decision-makers to blindly imitate others, and the information learning motivation

of managers' herd behavior is stronger than that of their self-interest motivation. This makes managers more inclined to follow industrial and innovative investment behaviors that are conducive to enhancing enterprise value and correspondingly reducing financial asset allocations when making investment decisions. At this stage, the inhibitory effect of managers' herd behavior on corporate financialization is stronger than the promoting effect brought about by self-interested motives. When managerial herd behavior exceeds the threshold, driven by a strong herd mentality, their investment decisions are more likely to follow blindly. For self-interested motives, managers are more inclined to follow financialization behaviors that can obtain high profits. At this stage, the inhibitory effect of managerial herd behavior on corporate financialization is weaker than the promoting effect brought about by self-interested motives. Thus, we believe that under uncertain conditions, there exists a threshold for the influence of managerial herd behavior on corporate financialization. Corporate financialization is negatively affected by managerial herd behavior within a certain threshold and a promoting effect after exceeding a certain threshold. In summary, we propose the hypothesis.

H1: There is a U-shaped relationship between managerial herd behavior and corporate financialization.

Principal-agent theory states that there is a conflict of interest between the firm owner and the manager who fulfills the agency role because of their contradictory utility functions. Although the role of an agent determines the manager's decision-making motivation to seek personal gain, it is also necessary to consider personal reputation and career, which can constrain and balance the manager's self-interested motives. Corporate governance can incentivize, supervise, and balance managers' behavior through an internal governance structure composed of shareholders' meetings, supervisory boards, boards of directors, and management. The degree to which the corporate governance mechanism operates effectively can directly reflected in the level of corporate governance. Management's decision-making motivation to align with shareholders can be successfully motivated by good corporate governance (Zhou et al., 2020). Corporate governance can effectively reduce the agency problem and encourage management to prioritize choices that benefit the firm's interests, which reduces the opportunism motivation of managers and further reduces the financialization of managers for short-term profits. Thus, we propose the following hypothesis.

H2: Corporate governance negatively moderates the U-shaped relationship between managerial herd behavior and corporate financialization.

2. Sample, variables and methodology

2.1. Sample

This research uses A-share firms from Shenzhen and Shanghai that were listed between 2007 and 2021 as its sample. We use the following criteria to screen the sample data. First, companies in the real estate and finance sectors are not included. Second, firms that receive special treatment (ST) are not included. Third, samples that had fewer than five firms in the industry at the time of the sampling are not included. Fourth, we do not include samples where any of the pertinent study variables have missing values. Finally, 29009 annual observation data

points were obtained through the above screening. The CSMAR database is the source of all the chosen data. In order to prevent errors resulting from extreme values in the empirical data, the sample's continuous variables are all winsorized between 1% and 99%.

2.2. Variable definitions

2.2.1. Corporate financialization

We assess corporate financialization (*Fin*) using the ratio of financial assets held by firms to total assets, in line with Demir (2009) and Tang and Zhang (2019). The percentage of financial assets can more accurately represent a firm's propensity for making investments. Financial assets include investment real estate, available-for-sale financial assets, trading financial assets, derivative financial assets, net held-to-maturity investments, and net long-term equity investments. In addition, China implemented a new accounting standard in 2019 that does away with the usage of held-to-maturity investments and available-for-sale financial assets in the accounting treatment of financial assets. In this paper, the financial assets held by firms in 2019 and subsequent years include debt investments, trading financial assets, derivative financial assets, investment real estate, other debt investments, other equity instrument investments, other noncurrent financial assets, and net long-term equity investments.

2.2.2. Managerial herd behavior

In prior research, the measurement of managerial herd behavior is mainly analyzed from the results of managers' decision-making behavior, which indirectly measures their psychological deviations from conformity. Following Knyazeva et al. (2008), Cen and Tong (2018), and Fang (2012), we use the degree of variation between firm's investment levels and the average investment level of firms in the same industry to measure managerial herd behavior (*Mherd*), as follows: $Mherd_{i,t} = \left| Inv_{i,j,t} - IInv_{i,j,t} \right| / Ass_{i,t}$. $Inv_{i,j,t}$ represents the degree of newly increased investment by corporate *i* in industry *j* in year *t*. We use the balance sheet method to estimate $Inv_{i,j,t}$, and the calculation method is the difference between the firm's investment amount in year *t* and year *t* – 1. Intangible assets, construction in progress, and fixed assets are all included in the investment amount. $IInv_{i,j,t}$ represents the average value of the newly increased investment level of industry *j* where corporate *i* is located in year *t*. $Ass_{i,t}$ represents the average value of the total assets at the start and end of year *t*. To facilitate the observation of the empirical results, we take a negative value for the *Mherd* value in the empirical model. This means that the more serious the managerial herd behavior, the higher the *Mherd* value is.

2.2.3. Corporate governance

We quantify the degree of corporate governance (*Gov*) using the comprehensive indicators created by principal component analysis, in line with Zhang and Lu (2012), and Yu (2022). The indicators used by the principal component analysis include the structure of property rights, the shareholding ratio of the first largest controlling shareholder, the shareholding ratio of institutional investors, the shareholding ratio of the second-to-the-tenth-largest shareholder, whether the two functions of the director and general manager are integrated,

the proportion of independent directors, the shareholding ratio of management, and the number of meetings of the board of supervisors. The first principal component that results from principal component analysis is taken out as a measure of corporate governance. The larger the index value is, the higher is the degree of corporate governance.

2.2.4. Control variables

We select the following control variables based on the literature: firm size (*Size*), ownership structure (*State*), leverage ratio (*Lev*), corporate growth (*Growth*), firm age (*Age*), return on assets (*ROA*), financing constraints (*FC*), board size (*Board*), shareholding ratio between the first and second largest shareholders (*Hold*), the chairman severing as CEO (*Dual*), the independent director ratio (*Indpt*), and the firm value *(Tq*). The financing constraints are measured using the *SA* index. Furthermore, we take the absolute value of the original *SA* exponent to obtain *FC*. The *SA* is calculated as follows: $SA = -0.737 \times Size + 0.043 \times Size^2 - 0.040 \times Age$. In addition, the *Mherd* variable selected is based on the conditional mean value of industry division, which already contains the firm's industry information. To avoid multicollinearity, following Li and Liang (2020), we no longer consider the industry fixed effect in the empirical test.

Table 1 displays the definitions of the control variables.

Table 1. Control variable definitions

Variables	Definition
Size	Calculated as the natural logarithm of total assets.
Age	Calculated as the firm's age in years since its establishment.
State	If the firm is state owned, State equals one and zero otherwise.
Lev	Calculated as total debt over total assets.
Growth	The firm's operating income growth rate.
ROA	Calculated as net profits over total assets.
FC	The absolute value of the SA index.
Board	The number of directors.
Hold	Shareholding ratio between the first and second largest shareholders.
Dual	The chairman severing as CEO.
Indpt	The independent director ratio.
Tq	The firm value.

2.3. Empirical model

We specify the following model (1) in order to test how managerial herd behavior affects corporate financialization.

$$\begin{aligned} Fin_{i,t} = {} & \alpha_0 + \alpha_1 Mherd_{i,t} + \alpha_2 Mherd_{i,t}^2 + \alpha_3 Size_{i,t} + \alpha_4 Age_{i,t} + \alpha_5 State_{i,t} + \alpha_6 Lev_{i,t} \\ & + \alpha_7 Growth_{i,t} + \alpha_8 ROA_{i,t} + \alpha_9 FC_{i,t} + \alpha_{10} Board_{i,t} + \alpha_{11} Hold_{i,t} + \alpha_{12} Dual_{i,t} \\ & + \alpha_{13} Indpt_{i,t} + \alpha_{14} Tq_{i,t} + Year + \varepsilon_{i,t}. \end{aligned} \quad (1)$$

We specify the following model (2) in order to test the moderating effect of corporate governance.

$$Fin_{i,t} = \alpha_0 + \alpha_1 Mherd_{i,t} + \alpha_2 Mherd_{i,t}^2 + \alpha_3 Mherd_{i,t} \times Gov_{i,t} + \alpha_4 Mherd_{i,t}^2 \times Gov_{i,t} + \alpha_5 Gov_{i,t} + \alpha Controls + Year + \varepsilon_{i,t}. \quad (2)$$

$Mherd_{i,t}^2$ is a quadratic term of the managerial herd behavior. A group of control variables are called *Controls*, and *Year* is included for year fixed effects.

3. Empirical results

3.1. Descriptive statistics

Table 2 displays the descriptive statistics for the key variables. *Fin*'s average is 0.076, with a maximum of 0.547 and a minimum of 0, demonstrating significant variances in financial asset holdings across the study period, and large number of enterprises have become overly financialization. *Mherd*'s average is –0.137, with a maximum of –0.001 and a minimum of –1.348. *Mherd*'s standard deviation is 0.211, which suggests that there are considerable changes in managerial herd behavior in different years. The average of *State* is 0.369, revealing that 36.9% of the sample enterprises are state-owned firms. Additionally, a test of the variance inflation factor (VIF) is performed. All explanatory variables have VIFs less than 10, This implies that there is no issue with multicollinearity.

Table 2. Descriptive statistics of key variables

Variables	N	Mean	Std	Min	Max
Fin	29 009	0.076	0.105	0	0.547
Mherd	29 009	–0.137	0.211	–1.348	–0.001
Size	29 009	22.004	1.238	19.798	25.884
Age	29 009	10.012	7.067	1	31
State	29 009	0.369	0.482	0	1
Lev	29 009	0.406	0.203	0.043	0.858
Growth	29 009	0.176	0.383	–0.518	2.354
ROA	29 009	0.037	0.061	–0.241	0.196
FC	29 009	3.784	0.249	3.132	4.397
Board	29 009	8.611	1.721	2	18
Hold	29 009	9.631	16.565	1.003	107.493
Dual	29 009	0.271	0.444	0	1
Indpt	29 009	0.374	0.052	0.333	0.571
Tq	29 009	2.083	1.323	0.866	8.600

3.2. Main results

The outcomes of model (1) are presented in Table 3. The coefficients of $Mherd^2$ is 0.037 and statistically significant at the 1% level, as indicated by Column (1). The results show that

Mherd and *Fin* have a U-shaped relationship. On the left side of the U-shape, there is a negative correlation between *Mherd* and *Fin*. On the right side of the U-shape, managerial herd behavior is positively correlated with corporate financialization.

To test whether this nonlinear relationship meets the conditions for a U-shape, we further conduct a U-shaped relationship test on the model in column (1) of Table 3. The results demonstrate that the model presents a significant U-shaped relationship at the 1% level. The curvilinear relationship is legitimate when the threshold value of –0.619 is calculated, as it falls with the range of the independent variables [–1.348, –0.001]. Furthermore, we group the samples according to whether or not *Mherd* exceeds the threshold value of –0.619. The grouping test outcomes are displayed in column (2)–(3). When *Mherd* is less than the threshold value, *Mherd*'s coefficient is –0.025 and statistically significant at the 5% level, and *Mherd* has a negative impact on *Fin*. When *Mherd* is greater than the threshold value, its coefficient is 0.028 and statistically significant at the 1% level, and *Mherd* has a positive impact on *Fin*. This further confirms the U-shaped connection between *Mherd* and *Fin*, which supports hypothesis H1.

Table 3. Managerial herd behavior and corporate financialization

	(1)	(2)	(3)
	Full sample	*Mherd* < –0.619	*Mherd* > –0.619
Mherd	0.045***	–0.025**	0.028***
	(6.08)	(–2.00)	(5.16)
$Mherd^2$	0.037***		
	(5.58)		
_cons	–0.029	–0.227**	–0.032
	(–1.33)	(–2.00)	(–1.45)
Controls/*Year*	YES	YES	YES
Obs	29 009	1131	27878
Adj. R^2	0.1229	0.1096	0.1243

Note: t-statistics are reported in parentheses. ***, **, and * represent 1%, 5%, and 10% significance levels, respectively.

3.3. The moderating effect of corporate governance

The outcomes of model (2) are displayed in Table 4. Column (1) demonstrates that $Mherd^2$×*Gov*'s coefficient is not significant. We further conducted a grouping test on the samples based on whether *Mherd* is above the threshold (–0.619). Column (3) demonstrates that when *Mherd* is above the threshold, *Mherd*×*Gov*'s coefficient is –0.001, statistically significant at the 1% level, suggesting that *Gov* can weaken the promotion effect of *Mherd* on *Fin*.

However, column (2) of Table 4 demonstrates that when *Mherd* falls below the threshold, *Mherd*×*Gov*'s coefficient is not significant, resulting the regulatory effect of *Gov* on the negative effect of *Mherd* on *Fin* is not significant. This may be because when managers' herd behavior is low, their self-interested motivation is weaker than their information learning

Table 4. The moderating tests of corporate governance

	(1)	(2)	(3)
	Full sample	*Mherd* < –0.619	*Mherd* > –0.619
Mherd	0.056***	–0.025**	0.037***
	(7.14)	(–1.98)	(6.86)
Mherd×*Gov*	–0.001***	–0.0001	–0.001***
	(–3.33)	(–0.06)	(–3.78)
$Mherd^2$	0.039***		
	(5.16)		
$Mherd^2$×*Gov*	–0.0003		
	(–1.19)		
Gov	–0.0002***	0.0003	–0.0002***
	(–4.85)	(0.62)	(–4.72)
_cons	–0.040*	–0.209**	–0.044*
	(–1.81)	(–1.97)	(–1.95)
Controls/*Year*	YES	YES	YES
Obs	29 009	1131	27878
Adj. R^2	0.1238	0.1100	0.1249

Note: t-statistics are reported in parentheses. ***, **, and * represent 1%, 5%, and 10% significance levels, respectively.

motivation. The primary objective of managers' investment behavior at this point is the long-term worth of the corporate, meaning that there is no significant conflict of interest with corporate shareholders, counterbalancing the limitations imposed on managers by corporate governance. As such, corporate governance's regulatory impact is not immediately apparent.

In summary, *Gov* has a moderating influence on *Mherd* and *Fin*'s relationship. When the self-interested motivation of managerial herd behavior is strong, corporate governance can significantly weaken the promotion effect of managerial herd behavior driven by the self-interested motivation on corporate financialization, which supports hypothesis H2.

3.4. Robustness tests

3.4.1. Endogeneity concern

First, to mitigate the endogeneity problem caused by the possible existence of reverse causal relationships, we choose the data from the lagged one phase of the explanatory and control variables in model (1) for analysis. Column (1) of Table 5 displays the outcomes. Statistically significant at the 1% level, the coefficient of $Mherd^2$ is 0.035.

Second, we apply the propensity score matching method to mitigate the bias caused by sample self-selection. We select the upper quartile (75%) of *Mherd* as the threshold value, below which is the group with relatively low *Mherd*, and above which is the group with relatively high *Mherd*. We select *Size*, *Age*, *State*, *Lev*, *Growth*, *ROA*, *FC*, *Board*, *Hold*, *Gov*, and

Year as characteristic variables for the logit regression. According to the propensity score, 1:1 paid-back nearest neighbor matching is performed. The findings of the balance test indicate that there was a satisfactory matching effect since, after matching, the standard deviation of each matching variable is less than 10% for the lower group of *Mherd* compared to the higher group. Model (1) is retested with the matched samples. The outcomes are displayed in Table 5's column (2). At the 1% level, the coefficient of $Mherd^2$ is 0.041 and statistically significant. Furthermore, we employ 1:2 nearest neighbor matching, and the results show a good match. The matched sample regression results' primary variable coefficients agree with the empirical analysis.

In summary, the U-shaped relationship between *Mherd* and *Fin* is stable.

Table 5. Endogeneity concern and other robustness tests

	(1)	(2)	(3)	(4)	(5)	(6)
Mherd	0.043***	0.045***	0.034***	0.029***	0.024***	0.040***
	(5.32)	(3.05)	(7.93)	(4.49)	(3.11)	(4.38)
$Mherd^2$	0.035***	0.041***	0.025***	0.017***	0.022***	0.043***
	(4.23)	(2.62)	(6.14)	(3.32)	(3.12)	(4.48)
_cons	–0.039*	–0.144***	–0.008	–0.026	–0.046**	0.063***
	(–1.66)	(–4.09)	(–0.67)	(–1.17)	(–1.97)	(2.65)
Controls/*Year*	YES	YES	YES	YES	YES	YES
Obs	24 057	10 601	29 009	29 009	19 772	26 390
Adj. R^2	0.1246	0.1213	0.1284	0.1224	0.1192	0.1179

Note: t-statistics are reported in parentheses. ***, **, and * represent 1%, 5%, and 10% significance levels, respectively.

3.4.2. Other robustness tests

We do the several additional tests to test the robustness of the U-shaped relationship between *Mherd* and *Fin*. First, following Yu (2022), we reconstruct *Fin*. The new measurement method for *Fin* is the ratio of a firms' financial assets to its total assets. Financial assets encompass trading financial assets, available-for-sale financial assets, other equity instrument investments, derivative financial assets, net held-to-maturity investments, debt investments, and other debt investments. We substitute the new *Fin* into model (1) for retesting. The outcomes are displayed in column (3) of Table 5. The coefficient of $Mherd^2$ is 0.025.

Second, alternative measures of *Mherd*. The following is the computation method: $Mherd_{i,t} = \left| Inv_{i,j,t} - IInv_{i,j,t} \right| / Ass_{i,t}$. where $Inv_{i,j,t}$ represents the newly increased investment level of enterprise i in industry j in year t. We estimate $Inv_{i,j,t}$ using the cash flow statement method, which includes intangible assets, cash paid for the purchase and construction of fixed assets, and other long-term assets. The other variables are consistent with the variable definitions. To facilitate the observation of the results, a negative value is taken for the *Mherd* value. That is, the larger the *Mherd* value is, the more serious the manager's herd behavior. The new indicator of *Mherd* is brought into model (1) for a retest. The outcomes are displayed in column (4) of Table 5. The coefficient of $Mherd^2$ is 0.017.

Third, we change the sample interval. Considering that China began to use the new accounting standards in 2019, there have been significant changes to the financial instrument standards. Therefore, we exclusively use data on the listed firms from 2007 to 2018 to test model (1). The outcomes are displayed in column (5) of Table 5. The coefficient of $Mherd^2$ is 0.022.

Finally, samples with *Fin* of zero are eliminated. We exclude samples where the financial assets owned by enterprises are zero and retest model (1) in order to guarantee the robustness of the research findings. The outcomes are displayed in column (6) of Table 5. The coefficient of $Mherd^2$ is 0.043.

The above results show that the coefficient of $Mherd^2$ is significant positive, and the U-shaped relationship between *Mherd* and *Fin* is robust.

4. Further analysis

4.1. A comparative analysis of ownership structure

The ownership structure is an important element affecting firm investment decisions. There are major discrepancies between state-owned enterprises (SOEs) and nonstate enterprises (non-SOEs) in terms of information access, financing constraints, and other aspects, which can make the investment decisions of managers different. Thus, it is necessary to study the effect of the ownership structure on the connection between managerial herd behavior and corporate financialization.

We speculate that the effects of managerial herd behavior on corporate financialization in firms with various ownership structures vary significantly. To examine the heterogeneity of ownership structure, we use model (3), where *Controls* are identical to those in model (1).

$$Fin_{i,t} = \alpha_0 + \alpha_1 Mherd_{i,t} + \alpha_2 Mherd_{i,t}^2 + \alpha_3 Mherd_{i,t} \times State_{i,t} + \alpha_4 Mherd_{i,t}^2 \times State_{i,t} + \alpha_5 State_{i,t} + \alpha Controls + Year + \varepsilon_{i,t}. \quad (3)$$

The outcomes of model (3) are shown in Table 6. According to Column (1), $Mherd^2$*$State$ has a coefficient of –0.042 and significantly negative at the 1% level. This preliminarily indicates that *State* can weaken the connection between *Mherd* and *Fin*. By classifying the samples according on whether the *Mherd* is above the threshold (–0.619), we are able to test the SOE and non-SOE samples further. The outcomes of column (2) and column (3) demonstrate that, within the SOE sample, when *Mherd* is below the threshold, its coefficient is –0.059 and statistically significant at the 1% level. When *Mherd* is above the threshold, its coefficient is 0.010 but not significant. The outcomes of columns (4) and (5) show that in the non-SOEs sample, when *Mherd* is below the threshold, its coefficient is –0.004 but not significant. When *Mherd* is above the threshold, its coefficient is 0.035 and statistically significant at the 1% level. This suggests that when managerial herd behavior is relatively small, its inhibitory effect on corporate financialization is more significant in SOEs. When managerial herd behavior is more serious, its promoting effect on corporate financialization is more significant in non-SOEs. This may be because SOEs often receive preferential policies from the state and have a good relationship with banks, while non-SOEs are more

likely to face financing and industry constraints. Therefore, in non-SOEs, managers choose to blindly follow financialization investment behavior due to self-interested motivation, and the promotion effect of *Mherd* on *Fin* is more significant in non-SOEs. The information learning motivation of managerial herd behavior is dominant in SOEs, so the inhibitory effect of *Mherd* on *Fin* is more significant in SOEs.

Table 6. Heterogeneity of ownership nature

	Full Sample	SOEs		Non-SOEs	
	(1)	(2)	(3)	(4)	(5)
		Mherd < –0.619	*Mherd* > –0.619	*Mherd* < –0.619	*Mherd* > –0.619
Mherd	0.067***	–0.059***	0.010	–0.004	0.035***
	(7.40)	(–2.98)	(1.07)	(–0.22)	(5.51)
Mherd×*State*	–0.063***				
	(–4.18)				
$Mherd^2$	0.051***				
	(5.61)				
$Mherd^2$×*State*	–0.042***				
	(–2.80)				
State	–0.013***				
	(–6.42)				
_cons	–0.027	–0.396**	–0.005	–0.021	–0.049*
	(–1.23)	(–2.40)	(–0.12)	(–0.14)	(–1.73)
Controls/*Year*	YES	YES	YES	YES	YES
Obs	29 009	446	10 275	685	17 603
Adj. R^2	0.1235	0.0666	0.1084	0.1691	0.1510

Note: t-statistics are reported in parentheses. ***, **, and * represent 1%, 5%, and 10% significance levels, respectively.

4.2. Corporate financialization and innovation investment

The strategic decisions of firms inevitably lead to corresponding economic consequences, and the economic consequences of corporate financialization are a concern of current research, especially the consequences related to corporate innovation. Moreover, corporate innovation is closely linked to a company's long-term worth and competitiveness and can indirectly reflect the implications of corporate investment decisions.

As a result, we further examine the effects of managerial herd behavior on the connection between corporate financialization and innovation investments. According to the "preventive saving" motivation, holding financial assets by firms may help provide enough cash flow and strong financial performance (Theurillat et al., 2010). Thus, corporate financialization might encourage business innovation. According to the "speculative profit-seeking" motivation, firms may forego innovative investments with lengthy payback periods and high levels of uncertainty in favor of allocating more financial assets. The majority of the research has

demonstrated that corporate financialization may crowd out enterprise innovation (Li & Wang, 2021; Su & Liu, 2021; Xu & Xuan, 2021). It is clear that corporate financialization may impact corporate innovation in both positive and negative effects. Due to the "information learning" motivation, managers may collect information by following the innovative behavior of other firms, which can reduce the cost and risk of innovation investments for firms. Due to the "self-interested" motivation, managers may be tempted to invest more in innovation if other firms do so as well to maintain their competitive edge in the market.

In summary, we hypothesize that corporate financialization and innovation investments have an inverted U-shaped relationship. The relationship between corporate financialization and innovation investments can be strengthened by managerial herd behavior. To verify the above relationship, we use model (4). We consider corporate innovation to be an investment behavior when measuring innovation investments (*Rd*). The ratio of a firm's current R&D investments to total assets is chosen to quantify *Rd*. The higher the *Rd* value is, the higher the innovation investment level of the enterprise. The outcomes are shown in Table 7.

$$\begin{aligned} Rd_{i,t} = {} & \alpha_0 + \alpha_1 Fin_{i,t} + \alpha_2 Fin_{i,t}^2 + \alpha_3 Fin_{i,t} \times Mherd_{i,t} + \alpha_4 Fin_{i,t}^2 \times Mherd_{i,t} \\ & + \alpha_5 Mherd_{i,t} + \alpha_6 Size_{i,t} + \alpha_7 Age_{i,t} + \alpha_8 State_{i,t} + \alpha_9 Lev_{i,t} + \alpha_{10} Growth_{i,t} \\ & + \alpha_{11} ROA_{i,t} + \alpha_{12} FC_{i,t} + \alpha_{13} Board_{i,t} + \alpha_{14} Hold_{i,t} + Year + \varepsilon_{i,t}. \end{aligned} \quad (4)$$

First, Column (1) of Table 7 shows that the coefficient of Fin^2 is -0.047, statistically significant at the 1% level, indicating an inverted U-shaped connection between *Fin* and *Rd*. We subsequently perform an inverted U-shaped relationship test on column (1) to determine

Table 7. Corporate financialization and innovation investment

	(1)	(2)	(3)	(4)
	Full Sample	Full Sample	*Fin*<0.120	*Fin*>0.120
Fin	0.011***	0.016***	0.023***	–0.009**
	(3.12)	(3.64)	(4.44)	(–2.26)
Fin×*Mherd*		0.053***	0.067***	0.024
		(2.81)	(2.91)	(1.53)
Fin^2	–0.047***	–0.053***		
	(–4.75)	(–4.38)		
Fin^2×*Mherd*		–0.057		
		(–1.10)		
Mherd		0.008***	0.007***	0.016***
		(8.69)	(6.78)	(3.66)
_cons	0.083***	0.103***	0.090***	0.153***
	(20.74)	(24.26)	(20.02)	(13.76)
Controls/*Year*	YES	YES	YES	YES
Obs	23806	23806	19219	4587
Adj. R^2	0.1122	0.1201	0.1082	0.1707

Note: t-statistics are reported in parentheses. ***, **, and * represent 1%, 5%, and 10% significance levels, respectively.

whether this nonlinear relationship satisfies the requirements for an inverted U-shaped connection. This findings demonstrate that the model displays a significant inverted U-shape at the 1% level. We may compute that the threshold value is 0.120, falling within the independent variables' range of [0, 0.491], indicating that the curvilinear relationship is legitimate.

Second, Column (2) of Table 7 demonstrates that $Fin^2 \times Mherd$'s coefficient is –0.057 but is not statistically significant. We continue to group and retest the samples based on whether *Fin* is above the threshold (0.120). Column (3) demonstrates that *Fin*×*Mherd*'s coefficient is 0.067 and statistically significant at the 1% level, indicating that *Mherd* can increase the positive effect of *Fin* on *Rd* when *Fin* is low. Column (4) shows that the coefficient of *Fin*×*Mherd* is 0.024 but is not significant, indicating that when the level of corporate financialization is large, the negative impact of managerial herd behavior on corporate financialization crowding out innovation investments is not significant. This may be due to the positive regulatory impact of managerial herd behavior being closely linked to corporate financialization, while excessive financialization can reduce corporate innovation investments. Thus, *Mherd* progressively loses its positive regulatory function as *Fin* increases. In summary, the inverted U-shaped relationship between *Fin* and *Rd* is positively regulated by *Mherd*.

Conclusions

From the perspective of managers' behavioral preferences, we empirically examine the impact of managerial herd behavior on corporate financialization. We find a U-shaped relationship between managerial herd behavior and corporate financialization. In addition, we find that at the same level of managerial herd behavior, companies with high levels of corporate governance have relatively low levels of financialization. Further studies show that the promotion effect of managerial herd behavior on corporate financialization is more significant in non-SOEs, and the inhibitory effect of managerial herd behavior on corporate financialization is more significant in SOEs. We further find an inverted U-shaped relationship between corporate financialization and innovation investments. Moreover, managerial herd behavior can enhance this inverted U-shaped relationship.

The research conclusion of this paper has important practical guidance significance for listed companies and policy makers of related departments. For listed companies, first, it is critical to accurately comprehend how managerial behavioral preferences affect corporate investment choices. Managers should rationally react to their herd mentality to prevent excessive financialization, which is brought on by extreme herd behavior. Second, firms can effectively motivate and control managers' behavior by establishing a rational and scientific governance structure and enhance governance mechanisms, preventing excessive financialization. For policy makers in relevant departments, first, it is necessary to reasonably regulate corporate financial investment behavior to avoid blindly increasing or reducing financial asset allocation, resulting in the same group effect in the financial investment industry, and to avoid excessive financialization and the spread of systematic financial risks. To this end, relevant departments can provide certain policy support and subsidies to enterprises, provide diversified investment channels for enterprises, encourage enterprises to increase industrial investment and innovative investment, and maximize the utilization efficiency

of idle funds for enterprises. Second, policy makers should guide reasonable competition in the market, strive to create a competitive and orderly product market environment, and avoid the phenomenon of excessive corporate financialization caused by vicious competition in the industry. Third, regulatory authorities need to strengthen their supervision of excessive financialization of enterprises to avoid the concentrated outbreak of irrational behavior among these enterprises. To this end, relevant departments can explore the concept of classified supervision and adopt key supervision measures for enterprises with high financial investment returns and inadequate governance structures.

However, there are some limitations in this paper. The fundamental reason for managerial herd behavior is information asymmetry. Although this reason was mentioned in the theoretical analysis of this paper, it did not open the black box of managerial herd behavior from the perspective of information asymmetry. Therefore, future research will focus on examining the herd behavior of managers caused by information asymmetry, introducing signal transmission into conceptual models, and further exploring the impact of managerial herd behavior on investment decisions.

Funding

This work was supported by the National Natural Science Foundation of China (71971169).

Author contributions

Fangyun Wang conceived the study, collected the data and wrote the manuscript. Wenxiu Hu and Fangyun Wang were responsible for supervision. Li Liu and Li Yang were responsible for data analysis and discussion of the manuscript. Fangyun Wang wrote the first draft of the article. All authors agreed the final version.

Disclosure statement

The authors of this paper declare that there are no competing financial, professional, or personal interests from other parties.

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