

Bai, Yajie; He, Leilei; Tiegang, Zhang

Article

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Common institutional ownership and investment efficiency: Empirical evidence from China

Yajie Bai, Leilei He*, Tiegang Zhang

School of Economics, Central University of Finance & Economics, China

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Abstract

Common institutional ownership has become a significant form of shareholding in the capital market. Using panel data on 2395 listed companies in China from 2007 to 2020, we examine the investment efficiency of this ownership practice on microcorporate investment behavior. The estimates indicate that common institutional ownership has a significant positive relationship with corporate investment efficiency by reducing overinvestment. Further institutional heterogeneity analysis reveals that enterprises have independent and long-term investment horizon of common institutional investors, and the positive effect of common institutional ownership on enterprises' investment efficiency is stronger. The empirical results are validated by a series of robustness tests. This study provides empirical support for the performance of common institutional ownership participating in corporate governance and optimizing investment decisions.

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JEL classification: codes; G32; G34; L22

Keywords: Capital market; Common institutional ownership; Institutional heterogeneity; Investment efficiency

1. Introduction

With the opening up of China's capital market and the continuous development of institutional investors, the tendency for investors to hold shares of multiple listed companies in the same industry has become more prevalent (Chen et al., 2021). Common institutional ownership refers to the ownership status of a company that is jointly held by common institutional investors who participate in decision making. The practice has emerged as a significant form of shareholding in the capital market. We define an enterprise with common institutional ownership as one that is held by two or more institutional investors simultaneously while also holding shares in other enterprises in the same industry. Compared to individual

investors, institutional investors have more advantages regarding investment scale, information collection, talent reserve, and investment and financing experience. Therefore, common institutional investors' participation will inevitably affect enterprises' operation, management mode, and decision making behavior, particularly investment behavior.

Investment activities serve as an important guarantee for the promotion of enterprise value and advancing sustainable development (Liu et al., 2015; Stulz, 1990). Moreover, investment efficiency directly affects enterprises' growth potential and future profitability. Efficient investment activities refer to the rational allocation of enterprise resources and are an important way for enterprises to avoid risks and create value. However, in the actual investment process, enterprise investment decision-makers often deviate from optimal investment decisions because of the interference of multiple factors, resulting in inefficient investment. Inefficient investment activities waste social resources and damage shareholders'

* Corresponding author.

E-mail addresses: 2019110097@email.cufe.edu.cn (Y. Bai), 2019110098@email.cufe.edu.cn (L. He), zhangtiegang@aliyun.com (T. Zhang).

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wealth, and can even lead to operational risks such as stock price collapse (Habib & Hasan, 2017). Therefore, improving investment efficiency is an effective but challenging way for enterprises to achieve optimal resource allocation. Information asymmetry and agency problems are common in imperfect markets (Hong et al., 2008; Jensen, 1999; Myers & Majluf, 2001), which result in company's inefficiency through overinvestment and underinvestment (Chen et al., 2017).

Many institutional investors prefer to hold shares of multiple listed companies in the same industry in the same period. These investors are referred to as common institutional investors. Such investors can access more information regarding industry characteristics, simultaneously obtaining public information about the industry and the enterprises' private information (Kacperczyk et al., 2015; He et al., 2019), which alleviates the problem of information asymmetry when making investment decisions. Furthermore, common institutional investors focus on long-term investment value, and investment revenue depends on the overall income generated by holding shares in multiple listed companies (Hansen & Lott, 1996; Matvos & Ostrovsky, 2008). Common institutional investors endeavor to enhance the overall value of the enterprises held (Kostovetsky & Manconi, 2020), and investors' active participation in corporate governance helps enterprises cultivate synergies and changes the product market operating environment within the industry. From the perspective of investment efficiency, this study examines the impact of common institutional ownership on enterprise investment behavior, providing new insights into how enterprises can benefit from encouraging common institutional ownership.

Using panel data for 2395 listed companies in China from 2007 to 2020, we examine the impact of common institutional ownership on investment efficiency and the moderating effect of different types of common institutional ownership on this relationship. Our study reveals that common institutional ownership has a significant positive relationship with corporate investment efficiency. Moreover, the higher the degree of linkage and shareholding ratio of common institutional investors is, the more conducive it is to promoting enterprises' investment efficiency improvement. Our heterogeneity test reveals that enterprises have independent and long-term investment horizons of common institutional investors, and the positive effect of common institutional ownership on enterprises' investment efficiency is stronger. The baseline results remain valid following robustness tests using Heckman's two-stage regression, the instrumental variable (IV) method, and propensity score matching (PSM).

This study contributes to the literature in three ways. First, we clarify the relationship between common institutional ownership and enterprise investment efficiency and enrich the research regarding the economic consequences of common institutional ownership. Second, we explore the effect of a specific type of institutional ownership (common institutional ownership) on firms' investment efficiency, which encourages institutional investors' participation in listed companies' governance. Third, our study also has strong practical significance, as it proposes specific approaches for improving

enterprise investment efficiency from the perspective of common institutional ownership. This study provides empirical evidence for the performance of common institutional ownership in optimizing investment decisions and promoting the healthy development of the capital market.

The remainder of this paper is organized as follows. *Literature Review and Hypotheses* introduces the literature and hypotheses. *Data, Variables, and Empirical Approach* describes the data and identification strategy. *Empirical Results* presents the empirical results, and *Conclusions* presents the conclusion and implications.

2. Literature review and hypotheses

Institutional investors are significant participants in China's capital market and the phenomenon of institutional investors jointly investing in multiple listed companies has become increasingly common. Some studies have explored this phenomenon (He et al., 2019; Kostovetsky & Manconi, 2020; Park et al., 2019), primarily examining the economic consequences of common institutional ownership from perspectives of corporate governance (Kang et al., 2015; Martin & Schmalz, 2018), product market competition (Azar et al., 2018; Dennis et al., 2020; He & Huang, 2017), corporate mergers and acquisitions (Chris et al., 2018), corporate financial policy (Fang et al., 2015), and accounting information comparability (Zhou & Qin, 2021). However, limited research has focused on the relationship between common institutional ownership and enterprise investment efficiency. Determining the effect on resource allocation efficiency represented by enterprise investment efficiency is a basic problem in the field of corporate finance (Myers & Majluf, 2001).

Considerable academic research has been conducted on the factors affecting enterprises' investment efficiency. The general consensus of previous studies has been that in a frictional market investment environment, a company's investment efficiency is affected by the different investment opportunities generated by the information environment as well as being restricted by the severity of agency problems (Hong et al., 2008; Jensen, 1999; Myers & Majluf, 2001). Serious information asymmetry problems in the capital market lead to the inability of internal and external personnel to determine listed companies' real value. Enterprises' financing costs then increase, making it difficult to obtain sufficient funds to invest in valuable projects, resulting in insufficient investment (Myers & Majluf, 2001). Additionally, the separation of modern enterprises' control and management can allow both parties to advance private interests. In cases of large controlling shareholders, companies may be required to invest in related projects, resulting in overinvestment. Major shareholders may embezzle a company's funds, induce a lack of funds within the enterprise, and lead to insufficient investment (Johnson, 2000). Furthermore, managers may use enterprise funds to invest in projects that are personally beneficial, resulting in excessive investment. Investment plans with considerable potential returns may also be abandoned to avoid risking investment failure, resulting in insufficient investment (Jensen, 1999).

Based on the literature, we hypothesize that enterprises may be able to alleviate the problem of investment inefficiency through common institutional ownership. As joint shareholders of multiple companies in the same industry, common institutional investors have natural advantages in information access. Common institutional investors act as information intermediaries, participate in the capital market, and have an important role in interpreting and disseminating market information (Healy & Palepu, 2001). From another perspective, as important and large shareholders of a company, common institutional investors pay more attention to increasing the company's long-term value and improving corporate governance (Hadani et al., 2011). Therefore, their participation can effectively monitor companies' information disclosure quality to improve the information quality environment and alleviate information asymmetry. Common institutional investors participate in corporate governance and actively exercise the right of supervision, facilitating oversight of shareholder and management practices and effectively reducing short-sighted and opportunistic management conduct (Shleifer & Vishny, 1986). This in turn inhibits the blind investment behavior of shareholders and managers guided by self-interest greatly reduce the possibility of agency problems, and improves the investment efficiency of enterprises.

H1. Other conditions remaining unchanged, common institutional ownership can improve enterprises' overall investment efficiency.

Enterprises make investment decisions based on the principle of net present value. To obtain surplus profits in a perfect market, any project with a positive net present value should be invested in, and an optimal investment level is possible to achieve (Modigliani & Miller, 1958). Because of multiple uncertainties in the actual investment environment, investment expenditure that deviates from the optimal level and fails to increase enterprise value is inefficient. Such deviation results in enterprise overinvestment if the enterprise's total capital stock exceeds its optimal capital level. Underinvestment occurs when an enterprise's total capital stock is lower than its optimal capital level. Although China's investment efficiency has improved in recent years, overinvestment, and underinvestment continue to be common occurrences for Chinese enterprises (Ding et al., 2016), which have experienced overcapacity and a significant rise in investment expenditure in the past decade (Lee et al., 2012). Some enterprises lack investment because of financing constraints. Decision makers' risk preferences, the type of investment, the degree of market prediction, and personal motivations for investment may lead to overinvestment or underinvestment. With inherent advantages, common institutional investors tend to participate in more rational investment activities, which improve enterprises' ability to bear risks and exploit emerging opportunities that can produce excess profits, thereby alleviating enterprise investment inefficiency. According to previous studies, the causes of overinvestment and underinvestment differ; thus, a logical question is whether institutional investors have different

effects on underinvestment and overinvestment. Therefore, this study divides enterprise investment inefficiency into overinvestment and underinvestment, proposing the second research hypothesis based on the above discussion.

H2. Other conditions remaining unchanged, common institutional ownership inhibits enterprises' overinvestment and alleviates underinvestment.

Previous research has examined the effect of different types of institutional investors on corporate governance and firm performance (Cornett et al., 2007; Guo & Platikanov, 2019). We posit that different institutional investors may exhibit heterogeneity in the same investment market, and as such, the role of enterprise investment efficiency may also be heterogeneous. Therefore, we classify institutional investors according to independence and investment horizon to further investigate the moderating effect between common institutional ownership and enterprises' investment practices in relation to different types of common institutional investors.

Heterogeneous institutional investors have diverse characteristics and shareholding objectives. According to existing literature, we define institutional investors with potential business relationships with the firms in which they invest as gray institutional investors, and those with no potential business relationships as independent institutional investors (Brickley, 1988; Cornett et al., 2007). The investment practices of institutional investors are value oriented. As independent institutional investors are not associated with listed companies, they often conduct professional investment investigations when seeking investment target companies. Previous studies have found independent institutional investors to be more motivated to participate in corporate governance and supervise management practices (Cornett et al., 2007; Guo & Platikanov, 2019). Under the assumption of a rational actor, institutional investors seek to maximize their own interests and will actively promote the development of the company and supervise its operation. However, gray institutional investor's shareholding not only endeavors to obtain investment income, but also strives to maintain existing or potential business ties with the company. To preserve business relationships with investee firms, gray institutional investors practice less supervision over investment behavior and have a weaker influence than independent institutional investors. Institutional investors differ in their willingness to participate in enterprises' internal governance and external supervision. Therefore, we assert that improvement in investment efficiency is advanced by the presence of common institutional or independent investors, proposing the following hypothesis.

H3a. Other conditions remaining unchanged, independent common institutional investors have stronger effects on improving investment efficiency than gray common institutional investors.

Some studies that have examined the influence of common and regular institutional investors on corporate decision making

have confirmed that only long-term institutional investors focus on corporate development and have a strong influence on corporate decision making (Dong & Ozkan, 2008; Du et al., 2021; Kang et al., 2018). Short-term institutional investors have insufficient motivation to supervise enterprises and exert less influence on enterprise decision making (Du et al., 2021; Kang et al., 2018). We classify institutional investors into long- and short-term investors based on the stability of investors' stock holdings (Du et al., 2021; Kang et al., 2018). Compared with short-term institutional investors, long-term institutional investors have more concerns when they choose to sell stocks. They weigh issues such as higher transaction costs, greater stock price decline, reinvestment, and investigation costs. Long-term institutional investors will also exercise supervision power through "voting by hand," which is reflected in monitoring the practices of major shareholders and management to improve their own equity returns (Cheng et al., 2010). Therefore, long-term institutional investors have a stronger motivation to supervise companies and are more inclined to conduct active corporate governance. The performance of short-term institutional investors is the opposite; for example, they practice more frequent trading times and numbers when stock price fluctuations occur (Chen et al., 2007). The investment practices of short-term institutional investors are often speculative. Short-term institutional investors prefer to "vote with their feet," prioritizing companies' short-term returns. Therefore, the investment position of long-term institutional investors can facilitate enterprises' improved investment efficiency. Specifically, long-term institutional investors can provide enterprises with adequate investment funds, comprehensive market information, and effective supervision and management. We propose the following hypothesis accordingly.

H3b. Other conditions remaining unchanged, long-term common institutional investors have stronger effects on improving investment efficiency than short-term common institutional investors.

3. Data, variables, and empirical approach

3.1. Data collection and sample size

China's revised Accounting Standards for Business Enterprises were implemented in 2007; thus, we use 2007 as the initial point of the study's sample interval to avoid the impact of differences between the old and new accounting standards. The study uses data from the China Stock Market & Accounting Research (CSMAR) Database and WIND and CHOICE Financial Terminals from 2007 to 2020. We exclude companies with asset–liability ratios less than 100% and those with institutional ownership ratios exceeding 100% as abnormal values. In addition, we remove firms that do not provide financial data and winsorize all continuous variables on a 1% scale to exclude the impact of extreme values. The final sample includes 2395 listed companies and 22,141 firm-year observations.

3.2. Variable measurement

3.2.1. Dependent variable

We reference Richardson (2006) for calculating investment efficiency (Inv_efficiency), using the following model to estimate the optimal investment level:

$$\begin{aligned} Invest_{i,t} = & \beta_0 + \beta_1 Invest_{i,t-1} + \beta_2 Size_{i,t-1} + \beta_3 Lev_{i,t-1} + \\ & \beta_4 Growth_{i,t-1} + \beta_5 Cash_{i,t-1} + \beta_6 Return_{i,t-1} + \\ & \beta_7 Age_{i,t-1} + Industry_{i,t} + Year_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (1)$$

where $Invest_t$ and $Invest_{t-1}$ represent new investment expenditure in periods t and $t-1$, respectively, which is measured by the net increase in fixed assets, construction in progress and construction materials, long-term investment, and intangible assets divided by total assets at the beginning of the year. $Size_{i,t-1}$ represents the company's size, which equals the natural logarithm of total assets in period $t-1$; $Lev_{i,t-1}$ is the company's liability-to-asset ratio in period $t-1$; $Growth_{i,t-1}$ is the company's growth measured by the growth rate of the operating income in period $t-1$. $Cash_{i,t-1}$ represents the company's monetary capital holdings in period $t-1$, which equals the sum of cash and short-term investment divided by total assets. $Return_{i,t-1}$ represents the company's stock return in period $t-1$. $Age_{i,t-1}$ the company's listing duration in period $t-1$. Industry and year dummy variables are also controlled in the model.

We then subtract the estimated optimal investment level from the actual investment level, taking the absolute value of the residual, which is used to measure investment efficiency, where a higher absolute value of the residual indicates a greater deviation from the optimal investment level and lower investment efficiency. Additionally, an estimated residual greater than zero implies that a company is overinvested, and an estimated residual value that is less than or equal to zero indicates that a company is underinvested.

3.2.2. Independent variables

The primary explanatory variables used in this study are CIO1, CIO2, and CIO3, which indicate whether there are common institutional investors in a company, how many common institutional investors the company has, and the shareholding ratio of common institutional investors, respectively. We first obtained 229,424 quarterly data observations from the CSMAR database, including institutional shareholding IDs and shareholding ratios in listed companies. After removing institutional investors with a shareholding ratio of less than 5% (Ramalingegowda et al., 2021), we define a common institutional investor as one that simultaneously holds equity in more than one company that is in the same industry at the quarterly level. As the rest of the data in this article were annual data, the data at the quarterly level were aggregated at the annual level. If a company had common institutional investors in any quarter, it is considered to have common institutional investors in that year, and CIO1 equals one. We then

calculate the number of common institutional investors in each quarter, summing them to obtain the annual number of common institutional investors (CIO2). Finally, we measure the average shareholding ratio of common institutional investors throughout the year (CIO3).

3.2.3. Control variables

Referencing previous research (Chen et al., 2011), we control for the following variables that may have had an impact on investment efficiency in the regression analysis: property rights (SOE), market size (Size), largest shareholder's ratio (First_share), managers' shareholding ratio (Managers_share), return on equity (ROE), leverage (LEV), the size of the board (Boardsize), and the ratio of independent directors in board (IndDirector). We also add managers' characteristics, including salary, age, male ratio, overseas, and financial considerations as additional control variables for robustness tests. Table 1 presents all variables' specific types and definitions.

3.3. Model specification and estimation procedure

We use the following empirical model to test our hypotheses:

$$Inv_efficiency_{i,t} = \beta_0 + \beta_1 CIO_{i,t} + \sum \beta_j CONTROLS_{i,t} + \lambda_{ind} + \lambda_t + \varepsilon_{i,t} \quad (2)$$

where *Inv_efficiency_{i,t}* is investment efficiency, and a higher value of *Inv_efficiency* indicates the company's lower investment efficiency. *CIO_{i,t}* is common institutional ownership, using CIO1, CIO2 and CIO3 as proxies. *CONTROLS_{i,t}* denotes a vector of control variables based on previous research. λ_t is the time fixed effect, and λ_{ind} is the industry fixed effect. $\varepsilon_{i,t}$ is the error term of firm *i* in year *t*, and β_1 measures the effect of common institutional ownership on investment efficiency.

Table 1
Variable definitions.

Type	Name	Definition
Dependent Variable	Inv_efficiency	Based on the investment efficiency measure proposed by Richardson (2006)
Independent Variable	CIO1	The common institutional ownership dummy equals 1 if a firm has common institutional investors in a quarter of the year
	CIO2	The degree of common institutional ownership, proxied as the number of a firm's common institutional investors
	CIO3	The shareholding ratio of common institutional investors, which is the sum of the shareholding ratio of common institutional ownership
Control Variable	SOE	Property rights equals 1 if companies are state-owned
	Size	Market size equals the logarithm of (1 + current market value)
	First_share	Shareholding ratio of the largest shareholder
	Manager_share	Shareholding ratio of managers
	ROE	Return on equity
	LEV	Leverage equals the ratio of total liabilities to total assets
	Boardsize	Board size equals the total number of board members
Managers' Characteristics Variables	IndDirector	Proportion of independent directors in the board
	Salary	Management salary is a logarithm of (management compensation + 1)
	Age	Average age of management
	MaleRatio	Gender ratio in management
	Overseas	Overseas background equals 1 if management has an overseas background
	Financial	Financial background equals 1 if management has a financial background

4. Empirical results

4.1. Summary statistics

Descriptive statistics are presented in Table 2. The mean value of CIO1 implies that approximately 20.5% of firms have common institutional investors. The Min and Max of CIO2 indicates that some companies do not have common institutional investors and there are 16 common institutional investors at most. The mean value of SOE indicates that 17.7% of companies are state-owned. On average, the largest shareholder holds approximately 35.8%, and management holds 5.78%. Notably, a wide variation in the minimum and maximum holding ratio of the largest shareholder and management is evident, and that the ownership structure varies considerably across companies. The minimum number of management team members is five and the maximum is 14. The lowest proportion of independent directors is 33.3%, and the highest is 50%, with an average of 37%. The values of other control variables are within a reasonable range and are not repeated here.

Table 2
Summary statistics.

Variable Name	Observations	Mean	Min	Max
Inv_efficiency	22,141	0.048	0.0018	0.2114
CIO1	22,141	0.205	0	1
CIO2	22,141	0.794	0	16
CIO3	22,141	8.489	0	67.740
SOE	22,141	0.177	0	1
Size	22,141	22.87	20.801	25.92
First_share	22,141	35.79	11.340	69.84
Manager_share	22,141	5.777	0	64.68
ROE	22,141	0.056	-0.119	0.183
The LEV	22,141	0.560	0.169	0.979
Boardsize	22,141	8.794	5	14
IndDirector	22,141	37.02	33.333	50.000

Table 3
Baseline results.

	Dependent Variable: Inv_efficiency		
	(1)	(2)	(3)
CIO1	- 0.0314** (-2.2680)		
CIO2		-0.0163*** (-4.9574)	
CIO3			-0.0011*** (-3.5956)
SOE	0.0662*** (6.6285)	0.0634*** (6.3693)	0.0655*** (6.5647)
Size	-0.0009 (-0.1431)	0.0020 (0.2981)	0.0004 (0.0604)
First_share	0.0030*** (5.6865)	0.0029*** (5.5941)	0.0030*** (5.7965)
Managers_share	0.0013* (1.7710)	0.0013* (1.7744)	0.0013* (1.7375)
ROE	0.8990*** (13.5083)	0.8913*** (13.3953)	0.8955*** (13.4594)
LEV	-0.1502*** (-6.3817)	-0.1477*** (-6.2766)	-0.1495*** (-6.3503)
Boardsize	0.0033 (0.8245)	0.0033 (0.8385)	0.0035 (0.8702)
IndDirector	-0.0019* (-1.7764)	-0.0020* (-1.8382)	-0.0019* (-1.7782)
Ind Fes	YES	YES	YES
Year Fes	YES	YES	YES
Observations	21,912	21,912	21,912
Adj. R ²	0.1797	0.1805	0.1800

Notes: Robust standard errors clustered at firm level are reported in parentheses. *p < 0.10, **p < 0.05, ***p < 0.01. Fes: Fixed effects.

4.2. Regression results

Table 3 presents the baseline results. Column (1) shows that the coefficient of CIO1 is negative and significant at the 5% level, indicating that listed companies with common institutional investors tend to have low investment inefficiency. In Column (2), the coefficient of CIO2 is negative and significant at the 1% level, indicating that a higher number of common institutional investors leads to lower corporate investment inefficiency. Column (3) shows that the coefficient of CIO3 is negative and significant at the 1% level. A higher shareholding ratio of joint institutional investors is correlated with lower investment inefficiency. As in our previous specifications, common institutional ownership has a significant negative effect on investment inefficiency. Overall, the baseline results in Table 3 demonstrate that common institutional ownership reduces investment inefficiency and increases investment efficiency, consistent with the view that common institutional investors have stronger incentives to increase their shareholder portfolio benefit. This result verifies H1.

4.3. Supplementary tests

4.3.1. Overinvestment and underinvestment

To isolate the effect of common institutional ownership on investment efficiency, we divide the dataset into underinvested and overinvested companies, presenting results of the effect of

common institutional ownership on underinvestment and overinvestment in Table 4.¹ The results reveal that the coefficients of CIO1, CIO2, and CIO3 are significantly negative for overinvested companies but not significant for underinvested companies, indicating that common institutional ownership increases investment efficiency in overinvested companies but has no statistically significant influence on underinvested companies. Common institutional ownership primarily alleviates overinvestment caused by excessive competition between firms, whereas underinvested firms may be subject to various constraints, such as credit constraints; thus, common institutional ownership only improves the investment efficiency of overinvested firms. This validates H2.

4.3.2. Institutional investors' heterogeneity: investors' independence and investment horizon

4.3.2.1. *Institutional investors' independence.* We classify common institutional ownership into different types to explore whether investment efficiency improvement can be correlated with the presence of different types of institutional investors. According to Cornett et al. (2007) and Guo and Platikanov (2019), we consider insurance, trust, brokerage wealth management products, commercial banks, and financial firms to be gray institutional investors, while others are considered to be independent institutional investors. When the firm's common institutional investors include independent institutional investors, Indep equals 1, whereas when the firm's common institutional investors are all gray institutional investors, Indep equals 0. To examine the effect of independent investors, we only regressed the sample with common institutional investors and added the multiplication term “Indep” with CIO2 and CIO3 in Eq. (2). The results are shown in Columns (1) and (2) of Table 5. The results imply that independent common institutional investors have a stronger influence on corporate investment efficiency than gray investors.

4.3.2.2. *Institutional investors' investment horizon.* To investigate the heterogeneous impacts of long- and short-term common institutional investors, we define those that hold shares in a company for four consecutive quarters as long-term investors (Du et al., 2021; Kang et al., 2018). When the firm's common institutional investors include long-term investors, Long equals 1, while when the firm's common institutional investors are all short-term investors, Long equals 0. To verify the effect of long-term investors, we only regress the sample with common institutional investors, adding the multiplication term Long with CIO2 and CIO3 in Eq. (2). The results are presented in Columns (3) and (4) of Table 5. The coefficients of the multiplication terms Long*CIO2 and Long*CIO3 are both significantly negative, indicating that long-term common institutional investors have a greater impact on corporate

¹ For brevity, we do not present the coefficients of control variables. These results are available from the author upon request. Table 4 is consistent with this note.

Table 4
Overinvestment and underinvestment.

Sample	Dependent Variable: Inv_efficiency					
	Overinvestment			Underinvestment		
	(1)	(2)	(3)	(4)	(5)	(6)
CIO1	-0.0896* (-1.8777)			-0.0020 (-0.1974)		
CIO2		-0.0402*** (-3.5537)			-0.0031 (-1.3273)	
CIO3			-0.0024** (-2.2815)			-0.0002 (-0.6788)
Control Variables	YES	YES	YES	YES	YES	YES
Ind Fes	YES	YES	YES	YES	YES	YES
Year Fes	YES	YES	YES	YES	YES	YES
Observations	7118	7118	7118	13,961	13,961	13,961
Adj. R ²	0.1917	0.1931	0.1919	0.2750	0.2751	0.2750

*p < 0.10, **p < 0.05, ***p < 0.01. Fes: Fixed effects.

Table 5
Investors' heterogeneity.

Type	Dependent Variable: Inv_efficiency			
	Indep		Long	
	(1)	(2)	(3)	(4)
Indep*CIO2	-0.0181** (-2.0197)			
Indep*CIO3		-0.0027** (-2.1844)		
Long*CIO2			-0.0101* (-1.7544)	
Long*CIO3				-0.0013*** (-2.6242)
CIO2	-0.0147 (-1.6062)		-0.0187** (-2.2687)	
CIO3		-0.0005 (-0.3470)		-0.0018** (-2.0920)
Control Variables	YES	YES	YES	YES
Ind FEs	YES	YES	YES	YES
Year FEs	YES	YES	YES	YES
Observations	4352	4352	4352	4352
Adj. R ²	0.1804	0.1822	0.1852	0.1851

Notes: Robust standard errors clustered at firm level are reported in parentheses.
*p < 0.10, **p < 0.05, ***p < 0.01. Fes: Fixed effects.

investment efficiency than short-term common institutional investors. All four of this study's hypotheses have now been verified.

4.3.3. Common institutional investors' decision making power

Common institutional ownership benefits corporate investment efficiency by mitigating excessive competition and improving information disclosure. Therefore, the greater the number of companies held by common institutional investors, the more capable they are expected to be in managing unfavorable competition and promoting resource sharing and effective collaboration. Referencing Du et al.'s (2021) practice, we construct a common institutional ownership power measure and add the multiplication term of Power with CIO2 and CIO3 in Eq. (2), which is calculated as the annual average number of

listed firms held by all common institutional investors. For example, if firm *i* has two common institutional investors A and B, A holds four firms' shares in the same industry and B holds three firms' shares, then common institutional investors' decision making power in firm *i* is (4 + 3)/2. A higher Power number indicates that firms' common institutional investors own a greater number of firms. The results are presented in Table 6. The coefficients of the multiplication terms Power*CIO2 and Power*CIO3 are both significantly negative, indicating that common institutional investors with higher Power have a stronger influence on corporate investment efficiency.

4.4. Additional tests

We further examine the robustness of our results using alternative measures of common institutional ownership and Heckman's two-stage model, PSM-OLS, and the IV approach to address potential endogeneity problems, conducting several additional robustness checks.

4.4.1. Alternative measures of common institutional ownership: top 10 and 3% measures

Considering that some of the top 10 shareholders of Chinese listed companies hold less than 5% of shares, they may still

Table 6
Investors' decision making power.

	Dependent Variable: Inv_efficiency	
	(1)	(2)
Power*CIO2	-0.0045* (-1.6966)	
Power*CIO3		-0.0008** (-2.1834)
CIO2	-0.0267*** (-4.2875)	
CIO3		-0.0026*** (-3.8065)
Control Variables	YES	YES
Ind FEs	YES	YES
Year FEs	YES	YES
Observations	4352	4352
Adj. R ²	0.1765	0.1770

Notes: Robust standard errors clustered at firm level are reported in parentheses.
*p < 0.10, **p < 0.05, ***p < 0.01. FEs: Fixed effects.

Table 7
Robustness test: Alternative measures of common institutional ownership.

Measures Ways	Dependent Variable: Inv_efficiency				
	Top 10		3%		
	(1)	(2)	(3)	(4)	(5)
CIO1–N	–0.0323*** (–3.6779)				
CIO2–N		–0.0040** (–2.2338)			
CIO1–3%			–0.0107* (–1.6714)		
CIO2–3%				–0.0074*** (–3.8598)	
CIO3–3%					–0.0008*** (–3.6782)
Control Variables	YES	YES	YES	YES	YES
Ind FEs	YES	YES	YES	YES	YES
Year FEs	YES	YES	YES	YES	YES
Observations	22,141	22,141	21,912	21,912	21,912
Adj. R ²	0.1729	0.1730	0.1682	0.1676	0.1676

Notes: Robust standard errors clustered at firm level are reported in parentheses. *p < 0.10, **p < 0.05, ***p < 0.01. FEs: Fixed effects.

exert a considerable impact on listed companies (Du et al., 2021). Therefore, we use the top 10 shareholders to construct a common institutional ownership measure for the robustness test, redefining common institutional investors as the top 10 shareholders, and recalculate the virtual variables of common institutional investors CIO1–N and the number of common institutional investors CIO2–N, replacing them in the benchmark model test. The results are presented in Columns (1) and (2) of Table 7. The coefficients of CIO1–N and CIO2–N are both significantly negative, verifying that our baseline results are robust.

Additionally, the *Company Law* in China stipulates that the shareholders who own more than 3% of a company's shares may submit written interim proposals to the board of directors for consideration 10 days before the general body meeting. Therefore, shareholders who own more than 3% of the shares of the company may have a certain influence on companies' decisions. We recalculate CIO1–3%, CIO2–3%, and CIO3–3% by changing 5%–3% and rerun the regression. The results are

presented in Columns (3)–(5) of Table 7. The coefficients of CIO1–3%, CIO2–3%, and CIO3–3% are all significantly negative, and the absolute values of the coefficients are all smaller than CIO1, CIO2, and CIO3 in the baseline regression. Compared to common institutional investors with 3% equity, those with more than 5% equity have a stronger influence on companies' decision making and can effectively improve investment efficiency.

4.4.2. Endogeneity tests

Intercausal endogeneity problems could exist between corporate investment efficiency and common institutional ownership. Firms with higher investment efficiency are more attractive to investors, which can lead to higher common institutional ownership. To alleviate potential endogeneity issues, we use the IV approach for regression, selecting the mean of the proportion of common institutional investors in the same industry as an IV. As enterprises in the same industry have similar industrial policies and technical conditions, there may

Table 8
Endogeneity tests.

Test Methods	Explanatory Variable: Inv_efficiency					
	IV		PSM-OLS		Heckman's Two-stage	
	(1)	(2)	(3)	(4)	(5)	(6)
CIO2	–0.1655*** (–9.2308)		–0.0168*** (–3.3481)		–0.0129*** (–3.3035)	
CIO3		–0.0160*** (–8.3840)		–0.0015*** (–2.8793)		–0.0011*** (–2.5810)
IMR					0.5721*** (7.5259)	0.5827*** (7.6599)
Control Variables	YES	YES	YES	YES	YES	YES
Ind FEs	YES	YES	YES	YES	YES	YES
Year FEs	YES	YES	YES	YES	YES	YES
N	21,912	21,912	6437	6437	21,912	21,912
Adj. R ²	0.4277	0.4297	0.1973	0.1968		
Wald chi ²					432.16***	425.94***

Notes: Robust standard errors clustered at firm level are reported in parentheses. *p < 0.10, **p < 0.05, ***p < 0.01. FEs: Fixed effects. IMR: Inverse Mills ratio.

Table 9
Additional robustness tests.

Test Methods	Dependent Variable: Inv_efficiency					
	Manager characteristics			Biddle et al. (2009)		
	(1)	(2)	(3)	(4)	(5)	(6)
CIO1	-0.0210** (-2.1821)			-0.0347** (-2.4053)		
CIO2		-0.0125*** (-3.7855)			-0.0218*** (-6.2003)	
CIO3			-0.0009*** (-2.7710)			-0.0014*** (-4.1098)
Manager characteristics	YES	YES	YES	NO	NO	NO
Control Variables	YES	YES	YES	YES	YES	YES
Ind FEs	YES	YES	YES	YES	YES	YES
Year FEs	YES	YES	YES	YES	YES	YES
Observations	21,888	21,888	21,888	18,499	18,499	18,499
Adj. R ²	0.1880	0.1886	0.1884	0.1759	0.1777	0.1766

Notes: Robust standard errors clustered at firm level are reported in parentheses. *p < 0.10, **p < 0.05, ***p < 0.01. FEs: Fixed effects.

be a correlation between the average shareholding ratio of common institutions in the industry and a single enterprise. In addition, the industry average value does not directly affect corporate investment decisions, thereby satisfying the exogeneity condition. The IV results are shown in Columns (1) and (2) of Table 8.

To avoid the endogeneity problem caused by selection bias, we also conduct a PSM-OLS analysis using CIO1 (a dummy variable that equals 1 if there are common institutional investors in a company) as the treatment variable to calculate the propensity scores. SOE, Size, First_share, Managers_share, ROE, LEV, Boardsize, and IndDirector are used as the matching variables. We employ nearest neighbor matching to identify a matched control group with similar characteristics and reestimate our model using the matched dataset. The PSM results are presented in Columns (3) and (4) of Table 8.

Sample selection bias may be present in our study. Specifically, institutional investors tend to have stock selection preferences and may be more inclined toward certain types of listed companies; therefore, some common characteristics of listed companies in the same industry may be an important factor leading to a higher degree of common ownership. In other words, this study's conclusion may have been driven by some factors of listed companies in the same industry, rather than the influence of common institutional ownership. To rule out this bias effect on the benchmark regression results, we use Heckman's two-stage model for testing, presenting the results in Columns (5) and (6) of Table 8. The endogeneity test results validate that the negative relationship between common institutional ownership and investment inefficiency still holds after considering endogeneity problems and sample selection bias.

4.4.3. Additional robustness tests

4.4.3.1. Controlling for manager characteristics. Lai and Liu (2018) found that executive teams' characteristics significantly affect enterprises' investment efficiency; therefore, to further control for the problem of missing variables, we add

management characteristics as control variables in the model, including salary, age, male ratio, overseas experience, and financial background. The results are presented in Columns (1)–(3) of Table 9. Common institutional ownership has a significantly negative relationship with corporate investment inefficiency after controlling for managers' characteristics.

4.4.3.2. Alternative measures of investment efficiency. In addition to Richardson (2006), Biddle et al. (2009) proposed a popular model for estimating the efficiency of corporate investment. We use the results estimated based on Biddle et al.'s (2009) model to conduct the regression again. Biddle et al. (2009) proceeded by first estimating a firm-specific model of investment as a function of growth opportunities, using the residuals as a firm-specific proxy for deviations from expected investment. The model is as follows:

$$Invest_b_{i,t} = \beta_0 + \beta_1 Growth_{i,t-1} + \varepsilon_{i,t} \tag{3}$$

where $Growth_{i,t-1}$ is the company's growth measured at a growth rate of its operating income in period $t - 1$. A small value of the residual $Invest_b_{i,t}$ indicates higher investment efficiency. The results are shown in Columns (4)–(6) of Table 9, and the coefficients of CIO1, CIO2, and CIO3 are all significantly negative, once again verifying that our baseline regression results are robust.

5. Conclusions

This study examined the influence of common institutional ownership on corporate investment efficiency, determining that common institutional ownership has a significantly positive relationship with corporate investment efficiency. Furthermore, an increase in the number of common institutional investors and shareholding ratio significantly improves enterprises' investment efficiency. We found that common institutional ownership only increases the investment efficiency of overinvested companies and has no significant impact on that of underinvested companies. We also examined investors' heterogeneity, finding that

long-term and powerful institutional investors have a stronger negative relationship with investment inefficiency. Our results remained robust to endogeneity concerns and other additional robustness checks and provide practical insights regarding the role of common institutional ownership as a governance tool for corporate investment decisions.

Two key policy implications arise from our findings. First, our results indicate that common institutional ownership increases investment efficiency. Regulators should establish a regulatory environment that promotes common institutional investors and guarantees their rights to participate in corporate governance. Taking advantage of common institutional investors' information access and investment experience to affect the company's investment decisions may help to avoid overinvestment. Second, listed companies should recognize the positive role of common institutional ownership in improving corporate governance. Introducing long-term, independent, and powerful common institutional investors can help companies form synergies within an industry, avoid inefficient investment caused by unnecessary investment competition, and improve investment efficiency.

Despite its contributions, this study also has some limitations. The effect estimates in the model were based on listed companies' data. Limited by data availability, this study selected listed companies as the sample to analyse the effect of common institutional ownership on investment efficiency, but data of unlisted companies are exceedingly difficult to collect; thus, we were unable to consider the impact of investors who hold both listed and unlisted companies. Future studies could expand our research by examining unlisted companies.

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