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Research article

Does ESG performance inhibit or promote herding behavior of institutional investors?

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Abstract: In recent years, environmental, social, and governance (ESG) issues have attracted much attention in the capital market. As the herding behavior of institutional investors is a prominent phenomenon in the capital market, it is of great value to explore how firms' ESG performance affects herding. Using A-share listed firms in China from 2009 to 2023 as a sample, we found that good ESG performance can inhibit herding. Moreover, the inhibitory effect is very pronounced for firms with low analyst attention and firms that do not hire a top-ten domestic audit firm, and this inhibitory effect is mainly driven by social responsibility (S dimension) and governance (G dimension) We also found that ESG performance can improve the price efficiency of the capital market. Our study expands the literature on the economic consequences of firms' ESG performance in terms of herding behavior of institutional investors.

Keywords: ESG performance; institutional investor; herding; information asymmetry; market price efficiency

JEL Codes: Q01, G23

1. Introduction

Environmental, social, and governance (ESG) issues have attracted much attention from the capital market in recent years. When firms actively improve their ESG ratings, especially environmental protection measures and social responsibility activities, it provides investors with more reliable information and reduces uncertainty. This information transparency allows analysts and institutional investors to conduct independent analyses based on more comprehensive data.

Institutional investors have had a large impact on the capital markets since China's efforts to develop them in 2001. In emerging markets, due to complex factors such as information asymmetry, institutional investors often choose to forgo the use of their own information and follow the decisions of other investors in order to ensure returns and avoid risk. This behavior leads to large-scale, homogeneous buying and selling of institutional funds, creating the phenomenon of institutional investors' herding behavior (Sias, 2004; Spyrou, 2013). The institutional investors' herding behavior can lead to the ineffective integration of their private information into the share prices of listed firms, which in turn triggers abnormal volatility in share prices (Brown et al., 2014). This phenomenon may damage the function of the capital market. Meanwhile, Jacobs (2016) finds that the strength of herding behavior among institutional investors is significantly higher in emerging markets than in developed markets due to lower information transparency in emerging markets. At present, there is little research studying how ESG performance affects the herding behavior of institutional investors. In view of this, issues, such as whether and through what channels ESG performance influences the herding behavior of institutional investors and whether the effects are different in different contexts, are worthy of a thorough investigation.

Using A-share listed firms in China from 2009 to 2023, we find that firms' ESG performance inhibits the genuine herding behavior of institutional investors. Moreover, the inhibitory effect is very pronounced for firms with low analyst attention and firms that do not hire a top-ten domestic audit firm, and this inhibitory effect is mainly driven by social responsibility (S dimension) and governance (G dimension). Finally, firms' ESG performance can significantly ameliorate the effects of market price inefficiency triggered by institutional investors' herding behavior.

Our study makes a threefold contribution. First, it expands the literature on the economic implications of firms' ESG performance. Previous studies show how ESG performance affects corporate behavior and capital market behavior, but none of them study its effect on herding.

Second, our study identifies a new driver of the herding behavior of institutional investors. Existing literature identifies investment managers' reputation (Scharfstein and Stein, 1990), compensation system (Maug and Naik, 2011), and investor sentiment (Rubbaniy et al., 2022) as drivers. We propose a new driver, namely, firms' ESG performance.

Third, our study reveals the mechanism by which firms' ESG performance affects the herding behavior of institutional investors, providing insights into the operational dynamics involved. Specifically, we find ESG performance improves earnings management, draws analysts' attention, improves analysts' forecasting accuracy, mitigates investors' information asymmetry, and thus discourages institutional investors' herding behavior.

The rest of this study is structured as follows. Section 2 reviews the literature and formulates hypotheses. Section 3 describes the research design. Section 4 reports the empirical results. Section 5 concludes the study.

2. Literature review and research hypotheses

This section first reviews the consequences of firms' ESG performance, then combs the influencing factors of institutional investors' herding behavior and finally puts forward the hypotheses.

Previous studies show that ESG performance affects firm development and capital markets.

First, the academic research documents the effects of firms' ESG performance on firms' value, efficiency, innovation, and risks. Firms' ESG performance can increase firm value (Barko et al., 2022; Chen and Xie, 2022). Specifically, the corporate social responsibility (CSR) activities can mitigate the negative impact of product recalls on firm value (Kong et al., 2019). Additionally, firms' ESG performance can improve investment efficiency (Hai et al., 2022) and increase dividend payments (Verga Matos et al., 2020). Moreover, ESG rating events in the presence of high financial investment can promote innovation (Li et al., 2023). Finally, firms' ESG performance can reduce credit risk (Wu and Xie, 2024), financial irregularities (Yuan et al., 2022), and risks for banks (Di Tommaso and Thornton, 2020) and IPO firms (Reber et al., 2022).

Second, most studies document the positive impacts of ESG performance on capital market behavior. Firms' ESG performance can reduce bond credit spreads (Lian et al., 2023) and the cost of debt capital (Gigante and Manglaviti, 2022). Firms' ESG performance can also improve stock liquidity (Cao et al., 2024), reduce crash risk (Feng et al., 2022; Bae et al., 2021), and improve price efficiency (Wu et al., 2022). Furthermore, significant CSR performance influences the behavior of institutional investors (Wang et al., 2011) and improves analysts' forecast accuracy (Eccles et al., 2014; Luo and Wu, 2022).

The extant literature rarely investigates the effects of ESG performance on institutional investors' herding behavior. Research in this area explains the herding behavior from two perspectives: information and noninformation. The noninformation perspective focuses on compensation incentives and professional reputation. Incentivized by the compensation structure, fund managers tend to mimic the investment strategies of peers (Agarwal et al., 2009). Additionally, to avoid being considered incompetent, fund managers choose to imitate the investment model of peers (Boyson, 2010).

The information perspective focuses on information asymmetry between firms and investors and among investors. Bikhchandani and Sharma (2000) classify herding into two types: genuine and spurious.

The information cascade theory explains genuine herding. Banerjee (1992) argues that the collective information revealed by the actions of earlier decision-makers may overwhelm the private information of a later decision-maker. Consequently, the later decision-maker may discard her private information and mimic her predecessors' actions. Banerjee (1992) implies that herding can occur in the capital market. Since a necessary condition for herding is information asymmetry between firms and investors, herding is more likely when firms' disclosures are less transparent (Trueman, 1994; Bikhchandani and Sharma, 2000). Herding may also arise in the presence of information asymmetry among investors. To avoid falling behind peers, investors tend to ignore their own private information and follow the investment decisions made by big investment firms (Agarwal et al., 2009).

In brief, the literature identifies information asymmetry as an important driver of institutional investors' herding behavior. This study adopts this perspective by examining how firms' ESG performance influences institutional investors' herding behavior.

Extant research finds that firms' ESG performance is one way of alleviating information asymmetry between firms and investors and among investors (Cui et al., 2018). In terms of the amount of information. ESG performance is part of firms' nonfinancial information. Firms with better ESG performance communicate more nonfinancial (Gelb and Strawser, 2001) and idiosyncratic information

(Bourveau and Schoenfeld, 2017) to external investors. According to the theory of economic externalities, negative externalities often stem from opaque information and inadequate regulation. Therefore, when firms actively improve their ESG ratings, especially environmental protection measures and social responsibility activities, it provides investors with more reliable information and reduces uncertainty. This information transparency allows analysts and institutional investors to conduct independent analyses based on more comprehensive data, rather than blindly following market trends or the behavior of their peers. In terms of information quality, having good ESG performance indicates that firms have a more complete institutional system and better governance, with a more robust monitoring mechanism that improves the quality of information disclosure, mitigates agency conflicts in firms, and is less prone to self-serving behaviors and earnings management that undermines firm value (Rezaee and Tuo, 2019; He et al., 2023). According to the information waterfall theory, in environments with high information asymmetry, individuals may ignore their private information and imitate the behavior of others (Banerjee, 1992). However, ESG performing firms significantly reduce information asymmetry by providing high-quality disclosures. This allows investors to obtain more reliable information so that they can rely on their own analyses to make decisions rather than blindly following market trends or the behavior of their peers. In addition, firms with good ESG performance often demonstrate stronger sustainability and risk management, sending positive signals to the market. These positive signals reflect a commitment to long-term strategic planning and responsible business practices, which can foster greater trust among stakeholders. Institutional investors can recognize the strengths of such companies based on their professionalism and consideration of long-term value, reducing herding behavior caused by uncertainty. We develop the following hypothesis:

H1a: Firms' ESG performance inhibits the genuine herding behavior of institutional investors.

Herding may not be "genuine" but "spurious" (Bikhchandani and Sharma, 2000). That is, each investor makes their decision based on their own information set rather than extracting information from predecessors' actions. When the information set of each investor is very similar, the trading decision of each investor is naturally similar (Froot et al., 1992). Arguably, when firms provide abundant information, it is very likely that each investor shares a common information set and does not need to extract information from predecessors' actions. One example of information provision is ESG performance.

First, when a firm demonstrates good ESG performance, it conveys more information about its sustainability to external investors (Bourveau and Schoenfeld, 2017). Some institutional investors may engage in a kind of pseudo-sheepish behavior out of concern for their reputation and image. Even if they have not studied ESG practices in depth, they may flock to invest in such companies in order to avoid being perceived by the market as lagging behind in the ESG investment arena, or for fear of missing out on potential investment opportunities.

Second, while companies with good ESG performance are often perceived as providing higher quality disclosures, in reality there are still limitations to the quality and depth of ESG information. For example, some nonfinancial metrics are difficult to quantify and there is a lack of uniform accounting standards; furthermore, some companies may exaggerate their ESG achievements for marketing purposes or simply engage in superficial efforts to appeal to current investment preferences. For institutional investors, if they do not have sufficient resources or expertise to verify the authenticity of these ESG statements in depth, they may be easily misled and consequently make investment decisions based on incomplete or misleading information. In this case, the similarity in decision-making among investors does not stem from genuine information sharing, but rather from a pseudo-sheeple effect due to common misunderstandings.

Since firms' disclosure of ESG performance is one way of enhancing the commonality of investors' information sets, we develop the following hypothesis:

H1b: Firms' ESG performance can promote spurious herding behavior among institutional investors.

3. Research design

Sino-securities index has evaluated the ESG performance of listed firms since 2009. Due to the limitation of ESG data, this article selects A-share listed firms in China from 2009 to 2023 as the research dataset and processes the sample as follows: (1) exclude all listed firms in the financial industry; (2) eliminate all ST and *ST firms; (3) eliminate IPOs; (4) eliminate firm-year observations with missing core variables; and (5) winsorize continuous variables by 1%. The firms' ESG performance data comes from the Wind database, and other data comes from the CSMAR database.

This article uses the OLS model:

$$Herding_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \sum Controls + \sum Industry + \sum Year + \varepsilon_{i,t} \quad (1)$$

The variables in Expression (1) are described below and Table 1 describes the variable definitions in detail.

3.1. Herding behavior of institutional investors, $Herding_{i,t}$

This article follows the measure of the herding behavior of institutional investors in Lakonishok et al. (1992) and Wermers (1999):

$$Herding_{i,t} = \left|p_{i,t} - E(p_{i,t})\right| - E\left(\left|p_{i,t} - E(p_{i,t})\right|\right) \quad (2)$$

where $p_{i,t}$ indicates the proportion of institutional investors who increase their holdings in firm *i* in quarter *t* among those who hold firm *i*'s stocks and $E(p_{i,t})$ represents the expected value of $p_{i,t}$, measured by the industry average of $p_{i,t}$. $\left|p_{i,t} - E(p_{i,t})\right|$ indicates that the unbalanced buying and selling. When the imbalance exceeds a certain threshold, it is regarded as herding behavior. Using $E\left(\left|p_{i,t} - E(p_{i,t})\right|\right)$ as the threshold, herding is believed to arise when $\left|p_{i,t} - E(p_{i,t})\right| > E\left(\left|p_{i,t} - E(p_{i,t})\right|\right)$. Otherwise, $Herding_{i,t} = 0$. This article uses the annual herding behavior of institutional investors by aggregating quarterly data. As the value of herding increases, the phenomenon of herding behavior of institutional investors is more pronounced.

3.2. Firms' ESG performance, $ESG_{i,t}$

To gauge ESG performance, this article uses the Huazheng ESG rating, which consists of 9 grades from "C" to "AAA." Based on data collected from listed firms since 2009, The Huazheng ESG rating uses a hierarchical system of indicators to evaluate their ESG performance, providing a comprehensive and standardized measure for investors to assess the sustainability and social responsibility of

companies. This rating system thus serves as a valuable tool for guiding investment decisions that prioritize long-term value creation.

3.3. Control variables

Following Zhao et al. (2021) and Gu et al. (2022), we use firm size (Lnsize), cash flow from operating activities (Cfo), return on assets (Roa), book-to-market ratio (BM), asset-liability ratio (Lev), equity concentration (Top1), nature of property rights (Soe), mortgage asset value (Fixed), annual return on stock price (Return), volatility in annual return on stock price (Volatility), stock turnover rate (Turn), and Year and Industry dummy variables as control variables. Table 1 lists the variables and their definitions.

Table 1. Variable definitions.

Variable	Symbol	Definition
Herding behavior of institutional investors	Herding	See Expression (2) in Subsection 3.1
ESG performance	ESG	Grades C to AAA are assigned values of 1 to 9, respectively
Firm size	Lnsize	Natural logarithm of total assets at the end of the year
Cash flow from operating activities	Cfo	Net cash flow from operating activities/total assets
Return on assets	Roa	Net profit/ [(total assets at the beginning of the period + total assets at the end of the period)/2]
Book-to-market ratio	BM	Firm book value/Firm market value at the end of the year
Asset-liability ratio	Lev	Total liabilities/total assets
Equity concentration	Top1	The shareholding ratio of the largest shareholder
Nature of property rights	Soe	1 if the firm is a state-owned enterprise, 0 otherwise
Mortgage asset value	Fixed	Total fixed assets/total assets at the end of the year
Annual return on stock price	Return	Annual average expected value of quarterly returns
Volatility in annual return on stock price	Volatility	Annual average volatility of quarterly returns
Stock turnover rate	Turn	The natural logarithm of the annual stock turnover rate
Discretionary accruals	DA	The absolute value of discretionary accruals estimated by the modified Jones model
Analyst forecast bias	DIF	Analyst forecast minus actual performance
Number of analysts following	LnAnalyst	the natural logarithm of 1 plus the number of analysts following
Big 10 audit firms	Big10	1 if the firm's auditor is a Big 10 audit firm, 0 otherwise
Dependence of individual asset returns on lagged market returns	D1	a ratio of the sum of the regression coefficients of lagged market returns to the sum of all the regression coefficients in model (3).
Number	Number	The number of listed firms in the city where the firms are located.
Industry	Industry	Industry dummy variable
Year	Year	Year dummy variable

4. Empirical results

4.1. Descriptive statistics

Table 2 presents the descriptive statistics, with a total of 43,438 observations. The average value of *Herding* is 0.0424, the median is 0.0000, and the maximum value is 0.4098, indicating that the proportion of listed firms that experience investor herding is not high, but the institutional investors' herding exists. The minimum value of ESG is 1.0000, the average value is4.1606, and the maximum value is 8.0000, indicating that firms' ESG performance is mostly moderate or excellent.

Table 2. Descriptive statistics.

Variable	Observations	Average value	Standard deviation	Minimum value	Median	Maximum value
Herding	43438	0.0424	0.0873	0.0000	0.0000	0.4098
ESG	43438	4.1606	0.9984	1.0000	4.0000	8.0000
Lnsize	43438	22.1929	1.3116	19.8672	21.9858	26.3725
Cfo	43438	0.0473	0.0694	-0.1598	0.0462	0.2456
Roa	43438	0.0357	0.0630	-0.2453	0.0370	0.1954
BM	43438	0.6221	0.2468	0.1205	0.6209	1.1925
Lev	43438	0.4173	0.2078	0.0505	0.4083	0.9088
Top1	43438	0.3399	0.1487	0.0838	0.3177	0.7410
Soe	43438	0.3418	0.4743	0.0000	0.0000	1.0000
Fixed	43438	0.2077	0.1569	0.0022	0.1749	0.6890
Return	43438	0.0363	0.1235	-0.1955	0.0180	0.4653
Volatility	43438	0.1953	0.1304	0.0262	0.1635	0.7378
Turn	43438	6.7565	5.5363	0.5933	5.0708	28.3344

4.2. Simple regression

The explained variable in Table 3 is the herding behavior of institutional investors. Column (1) only considers the impact of firms' ESG performance on the herding behavior of institutional investors, while column (2) considers all factors that affect the herding. Both columns show that firms' ESG performance and the herding behavior of institutional investors are significantly negatively correlated at the 1% level, indicating that firms' ESG performance inhibits the herding behavior of institutional investors, confirming the hypothesis H1a. Regarding the control variables, firm size (Lnize) and return on assets (Roa) inhibit institutional investors' herding behavior. First, firms with larger asset size tend to have more complex organization structures, more diversified business portfolios, and broader market coverage. These characteristics make large firms more resilient in the face of market volatility and better able to diversify risk. For institutional investors, investing in larger firms implies a relatively low level of risk, which reduces blind-following behavior due to uncertainty. Second, when institutional investors believe a firm has the ability to be consistently profitable, they rely more on exhaustive research and analysis rather than following short-term market trends or sentiment. Profitable firms are more likely to attract professional investors who focus on fundamental analysis,

and the very existence of such an investor base helps to curb herding behavior, as their investment decisions are based on in-depth industry understanding and company assessments.

Table 3. Baseline regression results.

Variable	(1) Herding	(2) Herding
ESG	−0.0162***	−0.0064***
	(−35.8611)	(−14.5363)
Lnsize		−0.0298***
		(−58.3146)
Cfo		−0.0279***
		(−4.0797)
Roa		−0.1554***
		(−16.5256)
BM		0.0492***
		(19.5738)
Lev		0.0451***
		(16.1932)
Top1		−0.0236***
		(−8.9051)
Soe		0.0200***
		(19.8146)
Fixed		0.0099***
		(3.0531)
Return		0.0224***
		(4.9369)
Volatility		−0.0004
		(−0.0990)
Turn		−0.0016***
		(−17.4697)
Constant	0.1125***	0.6840***
	(22.1153)	(61.6058)
Industry	Yes	Yes
Year	Yes	Yes
Observations	43438	43438
R−squared	0.0648	0.1825

4.3. Mediating effect of information quality

Information asymmetry is one of the main factors inhibiting the herding behavior of institutional investors. Firms with good ESG performance have better internal controls and less shortsighted

management behavior, which improves the quality of financial information. When institutional investors believe that the information they receive is reliable and expect other investors to act on similar information, they no longer need to blindly follow market trends or competitors' behavior but can make independent investment decisions based on their own analysis and judgement. In addition, firms with good ESG performance are usually more willing to disclose their nonfinancial information, such as environmental protection measures, employee welfare policies and social welfare activities. Such information not only enables analysts to obtain comprehensive and in-depth data but also reduces the cost of information gathering. Therefore, analysts are more motivated to conduct information mining. Meanwhile, good ESG performance helps analysts more accurately grasp a firm's operating conditions, development trends and potential risks. When analysts pay more attention to companies and provide more accurate forecasts, institutional investors can obtain fuller and more accurate information to make more rational decisions. This article uses earnings management (DA), analyst forecast bias (DIF), and analyst coverage (LnAnalyst) as the measure of the quality of firms' information generated internally. Table 7 indicates firms' ESG performance inhibits the herding behavior of institutional investors by improving the quality of earnings and analysts' forecasts.

Table 4. Mechanisms tests.

Variable	(1) DA	(2) DIF	(3) LnAnalyst
ESG	−0.0022***	−0.0345***	0.0867***
	(−3.2821)	(−4.5914)	(19.2926)
Controls	Yes	Yes	Yes
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
Observations	41032	23075	29818
R-squared	0.0614	0.0910	0.4177

4.4. Robustness tests

4.4.1. Instrumental variable method

To alleviate potential endogeneity, where high ESG-performing companies attract institutional investors or vice versa, this article selects the number of listed firms (*Number*) in the city where the firms are located as the instrumental variable to conduct the 2SLS test. We have adopted this approach because firms' ESG performance is correlated to the number of listed firms in the city where the firms are located. When *Number* is large, the competition facing the firms in the region will be greater, and the firms will be more motivated to improve ESG performance, thereby obtaining more resources. Since the number of listed firms in the city where a firm is located has no direct impact on the herding behavior of institutional investors, our instrumental variable *Number* satisfies the exogeneity requirement. Table 5 shows the results from a two-stage test. In the first-stage regression, the coefficient of *Number* is significantly positive at the 1% level, indicating that the instrumental variable can explain endogenous variables well. In the second-stage regression, the coefficient on ESG performance is −0.0602, which is significant at the 1% level. In summary, the results of the instrumental variable method further support the main conclusions of this article.

Table 5. Robustness check: 2SLS regression.

Variable	First stage	Second stage
	(1)	(2)
	ESG	Herding
Number	0.0003***	
	(8.3321)	
ESG		−0.0602***
		(−4.7851)
Controls	Yes	Yes
Industry	Yes	Yes
Year	Yes	Yes
Observations	43393	43393
R-squared	0.1649	0.1825
Wald test		61.175

4.4.2. Propensity score matching (PSM)

Considering that differences in a priori conditions between firms may lead to different institutional investor herding behavior, this article follows He et al. (2023) and Lian et al. (2023) and uses the PSM method. Specifically, we use the firms with ESG ratings of A, AA and AAA (ESG≥7) as the treatment group and the remaining firms as the control group. The control variables are matched between these two groups using the PSM method according to caliper matching (caliper range of 0.01). Unmatched samples are removed, while successfully matched samples are regressed according to model (1). The average treatment effect is ATT of −5.99, and its absolute value is greater than 2.58, which is significant at the 1% level. In addition, the kernel matching results show that the average treatment effect is ATT of −5.58, and its absolute value is greater than 2.58, which is significant at the 1% level. Table 6 shows that the coefficient of firms' ESG performance is still significantly negative, once again indicating the robustness of the results.

Table 6. Robustness check: PSM.

Variable	(1)	(2)
	Herding	Herding
ESG	−0.0063***	−0.0063***
	(−14.2745)	(−14.2712)
Controls	Yes	Yes
Industry	Yes	Yes
Year	Yes	Yes
Observations	42510	42509
Pseudo R^2	0.1817	0.1817

4.4.3. Controlling for individual fixed effects

We replace the individual fixed effects model for another robustness test. Column (1) of Table 7 shows that the regression coefficient of firms' ESG performance remains significantly negative.

4.4.4. Changing the range of year

The rise, fall and volatility of the stock market affect the sentiment of institutional investors (Rupande et al., 2019). We remove the data in 2015, a particularly tumultuous year marked by a stock market crash in the A-share market, but retain the data for the periods 2011–2014 and 2016–2023. Column (2) of Table 7 indicates that the coefficient of ESG remains significantly negative at the 1% significance level.

4.4.5. Replacing the explained variable

We draw on the processing method of Xu et al. (2013) and subtract 1.96 standard deviations from the mean of $\left|p_{i,t} - E\left(p_{i,t}\right)\right|$ as an adjustment term for the explained variable in Model (1). Column (3) of Table 7 shows that the coefficient of firms' ESG performance is -0.0095, which is significant at the 1% level.

4.4.6. Tobit model

Since the explained variable (*Herding*) is censored, we use the Tobit model to conduct a robustness test. Column (4) of Table 7 shows that the coefficient of firms' ESG performance is -0.0201, which is significant at the 1% level.

4.4.7. Additional control variables

We add audit quality as a control variable (Top10) high-quality auditing enhances the reliability of financial statements, enabling institutional investors to make investment decisions based on data that truly reflect the operating conditions of the business. Consequently, they are no longer compelled to follow the lead of other investors. When information is sufficiently transparent and credible, rational investors instead rely on their own analysis and judgment, thereby decreasing the likelihood of herd behavior. Column (5) of Table 7 shows that the inhibitory link between firms' ESG performance and institutional investors' herding behavior still holds.

Table 7. Robustness tests

Variable	(1) Herding	(2) Herding	(3) Herding	(4) Herding	(5) Herding
ESG	−0.0036***	−0.0065***	−0.0095***	−0.0201***	−0.0063***
	(−4.8364)	(−14.3451)	(−17.0471)	(−17.9341)	(−14.4282)
Controls	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes
Firm	Yes	No	No	No	No
Observations	31004	41049	43438	43438	43438
R-squared/Pseudo R^2	0.0892	0.1856	0.3809	0.5080	0.1830

4.5. Heterogeneous tests

4.5.1. Group test based on ESG scores

Following Fang et al. (2023), we conduct a group test based on ESG scores. Because of their long-term nature and uncertainty, the impacts of environmental issues are not easily visible through financial performance in the short term and are often underestimated by institutional investors who focus on immediate returns. In addition, the complexity of cost-benefit analyses of environmental measures and the varying impacts of various environmental strategies on corporate costs and competitiveness, as well as the lack of uniform standards or expectations, make it difficult for investors to assess environmental performance. As a result, it is difficult for environmental performance to guide the herding behavior of institutional investors. In terms of social responsibility, a positive corporate citizenship image and social contribution can earn public trust and support. This trust can translate into positive market ratings and long-term value creation, providing investors with a more stable and predictable investment environment. At the same time, companies that value social responsibility also tend to be more ethical in their operations and compliance, reducing legal risks and reputational damage arising from misconduct, making investors feel more comfortable and helping to reduce unnecessary panic selling or buying on the bandwagon. When a firm performs well in governance, it has a sound internal control system, a transparent information disclosure mechanism and effective board oversight. These features can enhance external investors' confidence in corporate governance and reduce information asymmetry, making investors more willing to rely on the company's financial reports and other official information to make investment decisions rather than blindly following the behavior of other investors. Columns 1–3 of Table 8 demonstrate that this inhibitory effect is mainly driven by social responsibility (S dimension) and governance (G dimension). The environmental (E) dimension is not significant primarily because the impact of environmental issues is long-term and uncertain, making it difficult to reflect on short-term financial performance. Additionally, the lack of uniform evaluation standards makes it challenging for investors to assess environmental performance accurately. In contrast, the social responsibility (S) dimension is significant because it enhances public trust and reduces legal risks, while the governance (G) dimension improves internal controls and information disclosure mechanisms, reducing information asymmetry and boosting investor confidence. These factors more directly influence investment behavior.

Table 8. The impact of ESG scores on herding behavior.

Variable	(1) Herding	(2) Herding	(3) Herding
Environ_score	−0.0005		
	(−1.5687)		
Social_score		−0.0030***	
		(−11.5602)	
Govnce_score			−0.0058***
			(−15.1960)
Controls	Yes	Yes	Yes
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
Observations	43438	43438	43438
R-squared	0.1781	0.1807	0.1837

4.5.2. Heterogeneity analysis based on analyst attention

Analysts can use their professional knowledge and skills to dig corporate information and disseminate it to institutional investors (Huang et al., 2018). Therefore, high analyst attention can improve institutional investors' information sets. However, when analyst attention is low, institutional investors have access to relatively little corporate information, making it difficult for them to gain a comprehensive and in-depth understanding of the true situation of a firm. In this case, institutional investors are more inclined to rely on the investment decisions of other investors in the market, especially large institutional investors, thus exacerbating herding behavior.

Consequently, we predict that the negative effect of ESG performance on herding is more pronounced for firms with low analyst attention. Column (1) and Column (2) of table 9 show that the coefficient of firms' ESG performance is significant at the 1% level among firms with low analyst attention, but not significant among those with high analyst attention. The results confirm that low analyst attention is more effective in mitigating information asymmetry through good ESG performance, thereby curbing institutional investor herding behavior.

4.5.3. Group test based on audit quality

Similar to analysts, auditors can use their professional knowledge and skills to dig corporate information to help form their audit opinions and reports of critical audit matters. By hiring high-quality audit firms, firms can enhance the quality and transparency of financial information, reduce the space for earnings management, and encourage investors to rely more on reliable information for independent decision-making. Therefore, audit firms of high quality can improve institutional investors' information sets.

Consequently, we predict that the negative effect of ESG performance on herding is more pronounced for firms that do not hire a top-ten domestic audit firm than those that do. Column (3) and Column (4) of table 9 show that the coefficient of firms' ESG performance is significant at the 1% level among firms that do not hire a top-ten domestic audit firm, but not significant among those that hire a top-ten domestic audit firm.

Table 9. Cross-sectional regression results

Herding	(1) High analysts' attention	(2) Low analysts' attention	(3) Big10	(4) Non−Big10
ESG	−0.0001	−0.0023***	−0.0046***	−0.0083***
	(−0.5042)	(−3.2569)	(−8.1487)	(−11.9871)
Controls	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Observations	15862	13956	24776	18662
R−squared	0.0650	0.1246	0.1731	0.2004
Between−group coefficient	(1)−(2) = 0.000		(1)−(2) = 0.000	

4.6. Economic consequences

Because investors ignore their private information and follow their predecessors in herds, private information is not impounded into the stock price, thereby damaging market price efficiency (Froot et al., 1992). Therefore, does firms' ESG performance have a mitigating effect on market price inefficiency triggered by institutional investor herding behavior? Following Hou and Moskowitz (2005), we measure market price efficiency as in model (3):

$$r_{i,t} = \alpha_{i,t} + \beta_1 \times r_{m,t} + \sum_{n=1}^{4} \delta_{i,n} \times r_{m,t-n} + \varepsilon_{i,t} \tag{3}$$

In model (3) $r_{i,t}$ represents the rate of return of stock *i* at time *t*, $r_{m,t}$ represents the market rate of return at time *t*, $r_{m,t-n}$ represents the market rate of return lagged *n* periods, and $\varepsilon_{i,t}$ represents the random error. The coefficients of the explanatory variables in model (3) are used to measure the dependence of individual asset returns on lagged market returns:

$$\mathrm{D1} = \frac{\sum_{n=1}^{4}\left|\delta_{i,n}\right|}{\left|\beta_1\right|+\sum_{n=1}^{4}\left|\delta_{i,n}\right|}. \tag{4}$$

D1 is a ratio of the sum of the regression coefficients of lagged market returns to the sum of all the regression coefficients in model (3). The smaller the D1, the higher the price efficiency.

Table 10 reports that the regression coefficients of institutional investors' herding behavior are all significant at the 1% level. However, the absolute value of the regression coefficient of ESG performance in Column (3) of Table 10 is 0.0016, lower than 0.0020 in Column (1) of Table 10. The same regressor variables as mentioned above are placed in the Sobel test. The p values of the Z statistics are all 0.0000. These results imply that firms' ESG performance can significantly ameliorate the effects of market price inefficiency triggered by institutional investors' herding behavior.

Table 10. The impact of ESG performance on market price efficiency.

Variable	(1) D1	(2) Herding	(3) D1
ESG	−0.0020***	−0.0064***	−0.0016**
	(−3.0873)	(−14.5363)	(−2.4755)
Herding			0.0609***
			(7.5016)
Controls	Yes	Yes	Yes
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
Observations	43438	43438	43438
R-squared/Pseudo R^2	0.3084	0.1825	0.3095

5. Conclusions

This article studies how firms' ESG performance impacts the herding behavior of institutional investors. We find that firms' ESG performance can inhibit herding and this result is robust. We also find that the inhibitory effect is very pronounced for firms with low analyst attention and firms that do not hire a top-ten domestic audit firm and this inhibitory effect is mainly driven by social responsibility (S dimension) and governance (G dimension). Finally, we find that firms' ESG performance improves the price efficiency of the capital market.

Based on the above conclusions, this paper makes four policy recommendations: First, in the face of the global trend towards sustainable development, firms should be proactive in practicing ESG and disclose more information about their firm attributes to facilitate institutional investors' access to information for rational decision-making. Second, institutional investors should focus on the analysis of fundamentals, delve into corporate ESG information and financial information and emphasize the value of long-term investment, to avoid speculative behaviors caused by blindly following the trend. Third, in the current market, regulation is becoming more perfect and policy regulation more strict; therefore, securities analysts need to play the market information intermediary role through the research report, investment consulting, and other ways to the majority of investors to pass the business information and thus improve the information efficiency of the capital market. Finally, regulators should improve regulatory policies on ESG disclosure. Relevant regulators should guide the market to practice ESG concepts through policy documents and other macro guidance, which is conducive to alleviating information asymmetry, actively guiding the sentiment of institutional investors, and acting as market stabilizers

Author contributions

Rongwu Zhang: Writing–original draft, Funding acquisition, Supervision. Huaqian Chen: Conceptualization, Methodology, Software, Data curation, Writing–original draft, Validation, Writing–review & editing. Wenjia Zhang: Software, Data curation. Tong Lu: Writing-reviewing and editing.

Use of AI tools declaration

The authors declare they have not used artificial intelligence (AI) tools in the creation of this article.

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Conflict of interest

All authors declare that they have no conflicts of interest in this paper.

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