

ESG Rating Divergence and Stock Mispricing

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Abstract: With the development and popularization of the concept of sustainable development, more and more investors have begun to use corporate ESG performance to measure the long-term development ability of enterprises, but due to the existence of different evaluation systems among different rating agencies, which has led to the emergence of ESG rating divergence. Against the background of widespread ESG rating divergence, this paper aims to investigate the impact of ESG rating divergence on the level of stock mispricing in the capital market. Through empirical research, it is found that, first, the greater the corporate ESG rating divergence, the greater the level of stock mispricing; second, this paper examines the path of the impact of ESG rating divergence on the level of stock mispricing. The findings show that the expansion of ESG rating divergence promotes the stock mispricing level by reducing the rational investor-institutional investor shareholding path. Meanwhile, when the nature of corporate ownership is state-owned enterprises, the more depressed investor sentiment, and the worse corporate ESG performance, the stronger and more significant the contribution of ESG rating divergence to the level of stock mispricing. Finally, this paper demonstrates the robustness of the research findings by the method of replacing the evaluation indicators of ESG rating divergence and stock mispricing level. This study not only confirms the negative impact of ESG rating divergence on the capital market, but also provides ways and means to improve the pricing efficiency of the capital market.

Keywords: ESG rating divergence; stock mispricing; institutional investors.

1. Introduction

With the frequent occurrence of social problems such as climate risks, population and employment challenges and public health incidents, the survival and development of mankind are facing unprecedented crises and tests. Against this backdrop, countries around the world have begun to pay great attention to the issue of harmonious coexistence between human beings and nature, and in 2004, the United Nations Environment Programme (UNEP) introduced the concept of ESG (Environmental, Social and Governance) for the first time, which incorporates three aspects of the environment, society and governance into the assessment of the sustainable development capability of enterprises. Since then, investors no longer focus only on the growth of operating profit, but also pay more attention to the sustainability of enterprises when scrutinizing their performance. Domestically, the country has been improving its ESG disclosure and assessment system in recent years in order to align with the global ESG evaluation system and facilitate the assessment of the international value of enterprises. The Fifth Plenary Session of the 19th CPC Central Committee put forward the new development concept of “Innovation, Coordination, Green, Openness and Sharing”, which clarifies the direction of development in the new era. This concept points out the way for social development at the macro level, while the ESG concept guides enterprises to maximize value from the three dimensions of environment, society and governance at the micro level. Overall, the new development concept coincides with the ESG concept, and together they are committed to sustainable economic development.

However, despite the fact that Chinese companies have been paying more and more attention to ESG construction in recent years, and the disclosure of ESG information has become increasingly rich and comprehensive, it is still difficult for investors to accurately assess the ESG performance of companies. This is because ESG information

is mostly descriptive information that is difficult to quantify, and unlike traditional financial information, it is difficult to directly consider a company's operating performance through indicators and data. This increases the difficulty for investors to analyze and process ESG information. As a result, professional ESG rating agencies have emerged, relying on their expertise to assess corporate ESG performance and give reasonable grades or scores to help investors make investment decisions. However, there is a gap between the beautiful vision and the reality. As the construction of international and domestic ESG systems is still in the primary stage, a unified evaluation system has not yet been formed, and there are differences in the measurement of corporate ESG performance by different rating agencies, leading to rating disagreements. It is difficult for investors to utilize rating data for investment when facing ESG rating divergence. Research on ESG rating divergence shows that the reasons for divergence mainly include: the lack of a unified evaluation system by rating agencies, the motivation of company managers to hide negative information, and the poor quality of ESG information disclosed by companies. Together, these factors contribute to ESG rating divergence.

Despite the prevalence of ESG rating divergence, existing domestic research has focused on the impact of corporate ESG performance on firms' operating performance and capital market performance. There is a gap in this research area regarding the impact of ESG rating divergence on stock mispricing. The issue of stock mispricing in China's capital market has been of great concern because it reflects the lack of market transparency and inefficient operation of the capital market, which may directly lead to the collapse of stock prices and harm the interests of investors. Based on this background, the purpose of this paper is to explore the impact of ESG rating divergence on stock mispricing and whether this implies that the quality of firms' ESG disclosure is poor, thus exacerbating the information asymmetry between firms and investors.

The rest of the paper is structured as follows: the second

part reviews the relevant literature, conducts a theoretical analysis and formulates research hypotheses. The third part introduces the definition of variables and the research idea. The fourth part analyzes the empirical results. The fifth part extends the study. Finally, the study is summarized and policy recommendations are made.

2. Theoretical Analysis and Literature Review

2.1. Literature Review

2.1.1. ESG rating divergence

Investors assessing corporate ESG performance mainly rely on ESG ratings or scores of rating agencies, but due to differences in the scoring systems, interpretation of indicators and the degree of access to information of different rating agencies, resulting in large differences in ESG scores. This phenomenon has attracted the attention of scholars at home and abroad and has become an important branch of ESG research.

In order to explore the sources of ESG rating divergence, scholars have conducted relevant studies. Berg et al. (2019) confirmed the heterogeneity of ESG scores among different rating agencies and categorized the sources of divergence as scope differences, metric differences and weighting differences. Kotsantonis and Serafeim (2019) and Dimson et al. (2020) have also added. Eccles and Strohle (2018) explored the causes of ESG rating discrepancies from a social origins perspective, while Lopez et al. (2020) and Abhayawansa and Tyagi (2021) found that less transparency in the rating agencies' scoring process also contributed to the divergence. In addition, corporate ESG disclosure is also a source of disagreement, with Christensen et al. (2021) finding a positive correlation between ESG disclosure and ESG rating disagreement.

Although academics have not yet reached a consistent explanation of the reasons for ESG rating divergence, the emergence of rating divergence affects investors' investment decisions. Foreign studies have shown that ESG rating divergence mainly has a negative impact on investors, company managers and other stakeholders, such as causing investors to doubt the accuracy of corporate ESG ratings, hindering investors' sustained investment behavior (Cortez et al. 2012; Gibson et al. 2021; Avramov et al. 2022), and having an uncertain impact on the company's stock price. However, from the perspective of the information production hypothesis, ESG rating divergence may imply more incremental information, positively affecting the functioning of capital markets and investor decision-making. Guntay and Hackbarth's (2010) study, as well as Hsueh and Kidwell's (1988) study, suggests that multiple credit ratings provide incremental information about the firm and reduce the firm's financing costs.

Overall, current research on ESG rating divergence focuses on foreign countries, while domestic scholars' studies mainly focus on the economic consequences of corporate ESG performance. Therefore, analyzing the impact of ESG rating divergence in the domestic market has greater research value, and can make up for the gap of the impact of ESG rating divergence on China's capital market, investors and other stakeholders.

2.1.2. Stock Mispricing

This paper focuses on the exploration of the root causes of stock mispricing. For the anomalies such as momentum effect

and scale effect that are difficult to explain under the traditional finance framework, behavioral finance provides a new perspective as an emerging force. Behavioral finance emphasizes that investors' irrational behaviors, such as cognitive bias, emotional influence and herd mentality, are the key factors that cause stock prices to deviate from their fundamental values. Meanwhile, information asymmetry theory is also an important theoretical pillar to explain stock mispricing.

From the investor's perspective, behavioral finance theory provides a strong support to explain stock mispricing. Investors overestimate the uniqueness and accuracy of the information they possess in an information asymmetric environment, which, combined with misjudgment and irrational emotions, leads to abnormal stock price volatility. Investor sentiment has a significant impact on the level of stock pricing, and both optimism and pessimism can drive price movements. The classic study by Miller (1977) confirms the significant impact of investor sentiment on the level of stock pricing, and both optimism and pessimism are effective in driving price movements. Stein (1996) also emphasizes that irrational investor behavior is the key factor that causes a firm's market mispricing. Bushman (2001) directly points out that investors' limited rationality and information asymmetry are the main causes of stock mispricing. In the Chinese capital market, the irrational behavior of investors can also lead to the mispricing of stock prices. Liu, Vicky and Wu, Hanzhang (2018), on the other hand, by comparing asset mispricing under optimism and pessimism, find that optimism has a more significant effect on price deviation. In addition, the study by Wang Lei and Kong Dongmin (2017) specifically emphasizes the positive role of institutional investors in the capital market. They point out that compared to ordinary investors, institutional investors, with their professional stock selection ability, stable investment strategies, and advantages in information acquisition and noise filtering, not only promote the market price discovery process, but also effectively enhance the pricing efficiency of the market.

2.2. Research Hypotheses

2.2.1. ESG rating divergence and stock mispricing

In studies on capital market pricing efficiency, information asymmetry and investor irrationality are cited as key factors contributing to stock mispricing. In analyzing the relationship between ESG rating divergence and stock mispricing, information asymmetry and investor irrationality can equally well explain the mechanism of action.

ESG ratings, as an important indicator of a company's ability to sustain development, have received widespread attention from investors, but some problems have been encountered when using ESG ratings to measure corporate value. Because different rating agencies have different evaluation systems and measurement standards for corporate ESG performance, ESG ratings of different rating agencies diverge, which further leads to investors' doubts about the real ESG performance of enterprises and makes it difficult for investors to use ESG rating information to make investment decisions. Overall, the divergence of ESG ratings increases the uncertainty of information, makes it difficult for investors to make decisions based on it, and even brings confusion and misinformation to investors, which will affect the pricing efficiency of the capital market, make the stock price deviate from its intrinsic value, and further trigger the phenomenon

of generalized mispricing of stocks in the capital market.

From the perspective of information asymmetry, the emergence of divergent ESG ratings on the one hand indicates that listed companies disclose raw information in a false or concealed manner. In this case, the credibility of ESG reports disclosed by enterprises will be greatly reduced, and it is difficult to ensure the authenticity of the information obtained by investors, which exacerbates the information asymmetry between the internal managers of enterprises and the external investors of enterprises, which leads to the wrong estimation of the value of the enterprise by investors, and when the biased estimation of the investor is reflected in the price of the stock, the price of the stock will gradually deviate from its intrinsic value. On the other hand, some studies point out that analysts are confused in making forecasts when there is a large divergence in ESG ratings. As the controversy over the ESG performance of listed companies increases, it becomes more difficult for analysts to predict their future performance, which in turn reduces the accuracy of their forecasts (Frank and Raphael, 2022). In addition, increased disagreement over ESG ratings leads to higher equity risk premiums (Brandon et al., 2021) and increased volatility and price variability of listed companies' earnings. Together, these factors increase the uncertainty of listed companies' asset prices, further widening the deviation between their intrinsic and market values.

From a behavioral finance perspective, heterogeneous investor beliefs can be used to explain the impact of ESG rating divergence on stock mispricing. Since investors are irrational, when there is ESG rating divergence, it will be more difficult for investors to use available information to make judgments about stock prices, and they will have heterogeneous expectations about the future prices of stocks. The presence of heterogeneous beliefs leads to the determinants of asset prices no longer being limited to fundamentals, but more integrated into investor sentiment, expectations, and specific trading behaviors. This change may contribute to the deviation between asset prices and their fundamental values, which in turn triggers the phenomenon of mispricing. Based on the above analysis, this paper proposes Hypothesis 1:

H1: The greater the divergence in ESG ratings, the higher the level of stock mispricing.

2.2.2. Intermediary effect: institutional investors holding shares

Compared with individual investors, institutional investors tend to be more in line with the characteristics of the "rational man" in economics, and have more influence on stock prices in the capital market, which is because institutional investors have a large scale of capital and a high proportion of shareholding, and they are more professional and standardized to build diversified investment portfolios to maintain ideal risk and return. ESG ratings, as a measure of long-term corporate value, have only gradually entered the public eye in recent years, and are therefore less understood by individual investors, most retail investors do not consider corporate ESG performance during the investment process, and are less likely to notice differences in ESG ratings. Institutional investors, on the contrary, tend to pay more attention to the long-term development ability of enterprises, and often use ESG performance to measure the potential of enterprises, so they are more likely to be more concerned about the impact of ESG rating divergence on the value of enterprises. For institutional investors, a large ESG rating

divergence means that the long-term development of the enterprise faces greater uncertainty, and risk-averse institutional investors will reduce their shareholding ratio, and when rational shareholders give up their shareholding, irrational shareholders become more numerous in the market, and it is more likely that the stock mispricing problem will occur; whereas, when the ESG rating divergence of the enterprise is small, the company's certainty of development will attract institutional investors to hold their shares, to promote value discovery in the stock market and reduce the level of stock mispricing.

This study chooses institutional investors' shareholding ratio as an indicator reflecting corporate information asymmetry, and institutional investors' shareholding ratio is used as the mediating variable in this study. This is because institutional investors are more likely to pay attention to ESG rating divergence and adjust their shareholding ratio as a result. If the reason for ESG rating divergence is the poor quality of corporate ESG disclosure, then institutional investors as rational investors will realize that ESG rating divergence increases the degree of information asymmetry between internal and external enterprises, and thus adjust their own shareholding ratio; however, if the reason for ESG rating divergence is only the difference in the evaluation methods of the rating agencies, then institutional investors as rational investors will find that the divergence does not mean that the enterprise reduces or hides the information asymmetry of the enterprise. However, if the reason for ESG rating divergence is only different evaluation methods of rating agencies, then institutional investors, as rational investors, will find that the divergence does not mean that the enterprises reduce or hide the disclosure of information, and the degree of information asymmetry between the enterprises and the external investors has not changed essentially. Overall, changes in institutional investors' shareholding can reflect whether ESG rating divergence has led to an increase in the degree of information asymmetry between firms' internal and external information. When the expansion of ESG rating divergence causes institutional investors to reduce their stock holdings, it indicates that the expansion of ESG rating divergence increases the degree of information asymmetry inside and outside the firm; however, when the change of ESG rating divergence does not significantly affect the proportion of institutional investors' stock holdings, the emergence of ESG rating divergence does not lead to an increase in the degree of information asymmetry. Further it illustrates the impact of changes in the degree of information asymmetry on stock mispricing through changes in institutional shareholding. The study in this paper concludes that ESG rating divergence expands the degree of information asymmetry between internal and external firms, and therefore ESG rating divergence causes institutional investors to reduce their holdings thus further leading to an increase in the level of stock mispricing. Based on the above analysis, this paper proposes Hypothesis 2:

H2: The expansion of ESG rating divergence will lead to the reduction of institutional investors' shareholding, which will lead to the increase of stock mispricing level.

2.2.3. Moderating Effects: Corporate ESG Performance; Property Rights; Investor Sentiment

(1) Property Rights

Listed companies can be categorized into state-owned enterprises (SOEs) and non-state-owned enterprises (NSOEs) according to their property rights, and SOEs are subject to

stricter regulation in terms of ESG disclosure. The Work Program for Improving the Quality of Listed Companies Held by Central Enterprises issued by SASAC in May 2022 mentions that centralized SOEs should implement the new development concept, explore the establishment of a sound ESG system, improve ESG performance, and play a leading role in the capital market. According to the requirements of SASAC, centralized SOEs should achieve full coverage of ESG report disclosure by 2023, which seems that the disclosure of ESG information of SOEs is mandatory. In the face of the mandatory disclosure requirements, SOEs lack the motivation to actively disclose their ESG information to gain investors' attention, and the purpose of disclosing ESG reports by SOEs is regarded as coping with the supervision rather than letting investors fully understand the status of corporate ESG construction. Therefore, this paper argues that among SOEs, divergence in ESG ratings tends to imply more severe information asymmetry and thus a greater positive impact on the level of stock mispricing. In non-state-owned firms, firms disclose ESG information voluntarily by company management, and the purpose of their disclosure is to gain investors' attention to further obtain financing in the capital market, so ESG information disclosed by non-state-owned firms may be more user-friendly for investors. Therefore, for non-state-owned firms, the increase in the level of information asymmetry due to ESG rating disagreement is smaller, and in turn, ESG rating disagreement contributes less to the level of stock mispricing.

The above analysis is based on the information asymmetry perspective, while the same hypothesis can be made based on the perspective of investor behavior. Due to their special ownership attributes, state-owned enterprises tend to give investors the impression that they are “big but not bad”, so even if there is a divergence in ESG ratings, investors still maintain an optimistic expectation of the company's operating conditions, which does not immediately adjust the market value of the stock to its intrinsic value, but instead further separates the market price from its intrinsic value. In contrast, the above situation does not exist in the case of non-SOEs. Investors will be more worried about the stability of the operation of non-SOEs, so when there is a divergence in ESG ratings, investors will pay more attention to the adjustment of stock expectations, and when the emergence of divergence raises the level of stock mispricing, the behavior of investors in non-SOEs will weaken the positive impact of divergence on stock mispricing. Based on the above analysis, this paper proposes Hypothesis 3:

H3: In state-owned enterprises, the positive impact of ESG rating divergence on stock mispricing is greater.

(2) Corporate ESG performance

Corporate ESG performance demonstrates a company's long-term development capability from a non-financial perspective and serves as a direct reflection of its social image and social value, which helps investors to fully grasp the company's profile and effectively mitigates the problem of information asymmetry in the market. Good ESG performance can help analysts and investors fully identify companies with long-term sustainable development potential. In order to emphasize their competitive advantages, in contrast to underperforming companies, companies with better ESG performance are often more willing to disclose ESG-related information in a more comprehensive manner, which provides analysts and investors with a rich source of non-financial information, and provides a strong basis for

rationally evaluating the value of the company, and encourages investors to form a more rational perception of the company's market value. In addition, when a listed company demonstrates superior ESG performance, it often means that the company upholds higher ethical standards and is more willing to take on social responsibility. Such companies have relatively less incentive for management to seek personal gain, and less tendency to manipulate surpluses to boost performance in violation of the law. They are more inclined to disclose true information openly and transparently, thus enhancing information transparency (Kim and Li, 2014). ESG-performing firms effectively mitigate the information barrier between investors and firms by reducing the information asymmetry between management and its shareholders. This positive effect promotes the healthy development of the capital market, reduces the phenomenon of “price bubbles”, and makes the market price closer to the real value of the enterprise. Therefore, the good ESG performance of enterprises can inhibit the enhancement of stock mispricing by ESG rating disagreement. Based on the above analysis, this paper proposes Hypothesis 4:

H4: The positive impact of ESG rating divergence on stock mispricing is weakened in companies with better ESG performance.

(3) Investor Sentiment

Investor sentiment is usually understood as investors' optimistic or pessimistic judgments about the market due to the twofold influence of their personal trading habits and changes in external factors. Currently, academics usually use the degree of stock market activity as a proxy variable for investor sentiment, so this paper draws on the methodology of Baker and Wurgler (2006) to use the annual average daily turnover rate of individual stocks as a proxy variable for investor sentiment. A high level of stock market activity tends to imply that investor sentiment is high, while a low level of stock market activity implies that investor sentiment is low. When investor sentiment is high, investor activity is higher, and the information contained in the capital market is more likely to be reflected in the stock price through investor trading behavior, so that the stock market value returns to its intrinsic value; while when investor sentiment is low, investor activity is low, and in the face of existing information investors may choose to adjust their shareholding ratios less or not at all, which leads to a larger discrepancy between the market value of the stock and its intrinsic value. ESG rating divergence is regarded as the uncertainty of ESG information disclosed by enterprises in the capital market, which implies a greater degree of information asymmetry between enterprises and investors. When investor sentiment is high, investors are more likely to adjust their shareholding ratios through ESG rating divergence, thus weakening the positive impact of ESG rating divergence on the level of stock mispricing; when investor sentiment is low, investors will reduce the adjustment of their shareholding ratios, and it will be more difficult for the information to be reflected in the stock price, so that the positive impact of ESG rating divergence on the level of stock mispricing in times of low investor sentiment will be enhanced. Based on the above analysis, this paper proposes Hypothesis 5:

H5: The positive impact of ESG rating divergence on the level of stock mispricing is stronger when investor sentiment is low compared to when investor sentiment is high.

3. Data Selection and Research Design

3.1. Sample Selection and Data Sources

In order to study the impact of ESG rating divergence on the level of stock mispricing, the first step is to measure corporate ESG rating divergence. Increasing the number of rating agencies can more accurately measure the level of ESG rating divergence, so this paper selects six rating agencies, which are Bloomberg, FTSE Russell, Vanguard, Merchant Universe Green, Runling Global, and Huazhang. In order to ensure as much as possible that companies have at least two or more ESG ratings in a given year, this paper chooses the timeframe from 2015 to 2023, thus ensuring that there are multiple ratings data to measure divergence. In summary, this paper takes A-share listed companies from 2015 to 2023 as the research sample and does the following with the sample data: (1) excludes ST and ST* companies; (2) excludes companies listed for less than one year; (3) excludes companies with missing variables; and (4) excludes companies with less than two ESG ratings, which results in a total of 19,534 sample observations after processing. In order to weaken the potential interference of extreme values on the analytical results, this paper implements a Winsorize treatment of 1% up and down for all continuous variables. Finally, this paper obtained 19,534 sample data.

The financial and stock data used in this paper are obtained from the CSMAR database; regarding the data on the rating results of the six selected rating agencies, except for the data of Runling Global, which are obtained from the official website of Runling Global, the data of the other rating agencies are obtained from the wind database.

3.2. Definition of Variables

3.2.1. Explanatory Variables

In quantifying the extent of corporate ESG rating divergence, the standard deviation of the rating scores of six rating agencies for the same firm is used as a measure of ESG rating divergence with reference to the study by Christensen et al. First, because the presentation of rating results by rating agencies is categorized into two types: scores and grades, in order to facilitate the measurement of divergence, this paper converts ESG ratings into scores in equal proportions and with values located between 0 and 10. Subsequently, the standard deviation between the rating results of each agency after standardization is calculated, and the calculated standard deviation is used to represent the degree of ESG rating divergence.

3.2.2. Explained Variables

Academic measures of the level of stock mispricing include the residual return modeling method (Ohlson, 1995; Dechow. et al., 1999), the relative valuation method (Baker and Wurgler, 2002), the variable decomposition method (Rhodes-Kropf et al., 2005; Lu Rong, 2017; Li Shanmin, 2020), manipulability accrual profit method (Sloan, 1996), and so on. However, the residual income model involves subjective judgment in measuring intrinsic value, which reduces the accuracy of assessing the level of stock mispricing to some extent. In addition, the relative valuation method based on Tobin's Q or similar metrics not only measures the level of stock mispricing of listed companies, but also reveals their debt burden status and potential investment opportunities, so the reliability of this method is also questioned to some extent. Therefore, this paper uses the variable decomposition method to measure the level of stock mispricing and measures the

robustness of the research results by using actionable accrued profit as a proxy variable to measure the level of stock mispricing.

According to Lu Rong (2017) and Li Shanmin (2020), this paper uses the decomposition of the market capitalization-to-book ratio to assess the degree of mispricing at the overall stock market, the individual company level, and the level of different stock industries, and this paper uses the level of stock mispricing at the company level after excluding the effect of the industry level as an explanatory variable in this paper.

3.2.3. Control Variables

Referring to domestic and international literature, this paper selects control variables from the dimensions of corporate governance and financial status. The control variables selected in the dimension of corporate governance are: equity concentration (Concent), whether the auditor is from the Big 4 (Big4), two positions (Dual), and the degree of centrality of the board of directors' network (Center); and the control variables selected in the dimension of financial status are: company size (Size), gearing ratio (Lev), return on total assets (ROA), stock annual average weekly return (Ret), and free cash flow (FC). All control variables use values from the subsequent period, and time dummies and industry dummies are included in this paper to control for time and industry fixed effects. The symbolic representation and definition of all variables in this paper are shown in Table 1.

3.3. Model Construction

In order to investigate the relationship between ESG rating divergence and stock mispricing level, this paper constructs industry and time double fixed effect model to verify the hypotheses of this paper, the model is shown in (1):

$$Misp_{i,t+1} = \alpha_1 + \beta_1 dis_{i,t} + \sum \beta_k Controls_{i,t} + Year + Industry + \varepsilon_{i,t} \quad (1)$$

The explanatory variable in the model is the level of stock mispricing of firm i in year $t+1$, the explanatory variable is the level of ESG rating divergence of firm i in year t , Controls represents the values of the control variables in year t , Year denotes the year dummy variable, and Industry denotes the industry dummy variable.

4. Analysis of Empirical Results

4.1. Descriptive Statistics

Table 2 shows the results of the descriptive statistics of the sample, the mean value of the explanatory variable stock mispricing level is 0.343, the minimum value is 0, the maximum value is 2.528, and the median value is 0.276, through the results of the descriptive statistics of stock mispricing, it can be seen that most of the stock mispricing level is concentrated in the below the mean, but there are also some stock mispricing level is high. The mean value of the explanatory variable ESG rating divergence is 1.075, the minimum value is 0, the maximum value is 3.163, and the median is 1.055, the mean value of ESG rating divergence is closer to its median value, which indicates that the distribution of the ESG rating divergence variable is more uniform, and is closer to the normal distribution. However, the ESG rating divergence of companies with larger ESG rating divergence has reached three times the mean value, and

the emergence of ESG rating divergence is more common in the macro view, but the differences between individuals are still obvious. In terms of control variables, company size (size), gearing ratio (lev), and free cash flow (FC) vary significantly across companies, which may be due to the existence of different asset structures among firms in different industries. The annual average weekly return (Ret) of companies is generally low, indicating that the overall return

level of China's stock market is not high, and stock prices are generally in a state of shock and stability. Concentration of corporate equity (Concent) is generally at a high level, indicating that China's enterprises have a large concentration of equity, and the major shareholders can have absolute voice and decision-making power in the company's operation and management.

Table 1. Main variables and definitions

Variable type	Variable name	Variable symbol	Variable definition
explanatory variable	stock mispricing	Misp.	According to the decomposition of the market value book ratio
explanatory variable	ESG rating divergence	Dis	6Standard deviation between the rating results of domestic rating agencies
intermediary variable	Institutional investors hold shares	Ins	The shareholding ratio of institutional investors
moderator variable	Investor sentiment	Sent	Use the annual average daily change rate of individual stocks as an agent variable of investor sentiment.
	The nature of property rights	SOE	The enterprise is state-owned, and the value is1; The enterprise is private, and the value is 2; The enterprise is foreign-funded, and the value is 3
	Corporate ESG Performance	ESG	6 Average rating results of domestic rating agencies
Control variables	Equity concentration	Concent	The shareholding ratio of the largest shareholder/The shareholding ratio of the top ten shareholders
	Whether the four major audits	Big four	The auditor comes from the four major, and the value is1; On the contrary, the value is0
	The integration of two positions	Dual.	.When the chairman and general manager of the enterprise are held by the same person, the value is1; On the contrary, the value is0
	Board of Directors Network Center	Center.	The measurement method is based on Xie Deren and Chen Yunsen (2012) The definition of network centrality in
	The scale of the company	Lnsiz	The natural logarithm of the total assets of an enterprise
	Asset-liability ratio	Lev.	Total liabilities/Total assets
	Return on total assets	ROA.	Net profit/Total assets
	Average annual weekly yield of stocks	Ret.	The average after summing the weekly yield of stocks in a year
	Free cash flow	FC.	Net cash flow of operating activities- Cash outflow from investment activities

Table 2. Descriptive Statistics

variable	N	mean	p50	sd	min	max
Misp	19534	0.343	0.276	0.287	0.000	2.582
dis	19534	1.075	1.055	0.498	0.000	3.163
lnsize	19534	22.536	22.271	1.528	16.412	31.431
Lev	19534	0.441	0.420	1.145	0.010	178.345
ROA	19534	0.029	0.034	0.236	-27.046	7.446
FC	19534	2.530e+08	36670436.713	6.535e+09	-3.614e+11	2.951e+11
Big4	19534	0.083	0.000	0.276	0.000	1.000
Dual	19534	0.314	0.000	0.464	0.000	1.000
Center	19534	0.444	0.440	0.345	0.000	3.000
Ret	19534	0.002	0.001	0.008	-0.045	0.075
Concent	19534	0.560	0.551	0.189	0.118	1.000

4.2. Correlation Analysis

Table 3 shows the results of pearson correlation analysis, according to Table 3, the pearson correlation coefficient between ESG rating divergence and stock mispricing level is 0.088 and significantly positive, which can initially confirm the hypothesis 1 of this paper: the expansion of ESG rating divergence will significantly increase the stock mispricing level. In addition, the pearson correlation coefficient and its significant level demonstrate the direction and degree of influence of the control variables on the level of stock mispricing, for example: the correlation coefficient between return on total assets (ROA) and the level of stock mispricing is 0.028 and is significantly positive at 1% level, which

indicates that the higher the ROA, the higher the level of stock mispricing. This is because higher return on total assets releases positive signals to the market to attract investors to hold shares, which in turn raises the share price, which leads to a further increase in the market value of the stock over its intrinsic value and an increase in the level of stock mispricing. The correlation coefficients between firm size (lnsize), corporate free cash flow (FC), whether it is audited by the Big 4 (Big4), average annual return on stock (Ret) and the level of stock mispricing are 0.03, 0.04, 0.029, and 0.069, respectively, and all of them are significantly positive on the level of stock mispricing, which is due to the fact that the increase in the values of the above control variables sends an optimistic message to the market.

Table 3. Correlation coefficients

	Misp	dis	lnsize	Lev	ROA	FC	Big4
Misp abs	1						
dis	0.088***	1					
lnsize	0.030***	0.178***	1				
Lev	-0.00500	0.019***	0.070***	1			
ROA	0.028***	-0.0100	0.037***	-0.742***	1		
FC	0.040***	0.020***	0.115***	0.00300	0.018***	1	
Big4	0.029***	0.057***	0.433***	0.030***	0.012*	0.077***	1
Dual	0.029***	-0.060***	-0.205***	-0.032***	0.00700	-0.019***	-0.068***
Center	0.00500	0.017***	0.050***	-0.00700	0.018***	0.0100	-0.00100
Ret	0.069***	0.00200	-0.048***	-0.011*	0.070***	-0.00300	-0.022***
Concent	-0.035***	0.019***	0.058***	0.013**	0.019***	0.019***	-0.011*
Continued from above							
	Dual	Center	Ret	Concent			
Dual	1						
Center	0.00900	1					
Ret	0.011*	0.00900	1				
Concent	-0.088***	0.00100	0.011*	1			

*** indicates that the coefficient is significant at the 1 per cent level, ** indicates that it is significant at the 5 per cent level and * indicates that it is significant at the 10 per cent level.

4.3. Analysis of Regression Results

4.3.1. ESG rating divergence and stock mispricing

Table 4 demonstrates the regression results for the ordinary multiple linear regression model and the double fixed effects model with and without the inclusion of control variables. In all four cases in the table, ESG rating divergence is significantly and positively related to the level of stock mispricing. In the ordinary multiple linear regression model with control variables, the level of stock mispricing increases by 0.041 units for every one unit increase in ESG rating divergence, while in the fixed effects model with control variables, the level of stock mispricing increases by 0.029 units for every one unit increase in ESG rating divergence. The regression results are consistent with the conjecture of Hypothesis 1 that an increase in firms' ESG rating divergence indeed expands the level of stock mispricing, and that ESG rating divergence does imply greater information asymmetry between firms and investors, and that investor behaviors are transmitted in the stock market, which further contributes to an increase in the level of stock mispricing. In terms of control variables, there is a significant positive correlation between

firms' gearing ratio (lev) and the level of stock mispricing in the fixed-effects model, suggesting that a higher gearing ratio is associated with more severe mispricing in stock prices. For every 1 unit increase in gearing ratio, stock mispricing level increases by 0.069 units, and this result is significant at 1% level; return on total assets (ROA) also has a significant positive effect on stock mispricing level, the higher the ROA, the greater the stock mispricing level, and for every 1 unit increase in ROA, the stock mispricing level increases by 0.01 unit. In addition, there is also a significant positive correlation between the average annual weekly stock return (Ret) and stock mispricing, when the average annual weekly stock return increases by 1 unit, the level of stock mispricing will increase by 2.82 units. Finally, there is a significant negative relationship between Concentration and the level of stock mispricing, where an increase of 1 unit in Concentration leads to a decrease of 0.13 units in the level of stock mispricing, which may be attributed to the fact that when equity is concentrated in the hands of a single individual, it reduces the deviation of the market value of a stock from its intrinsic value due to checks and balances among multiple shareholders.

Table 4. Benchmark regression results

VARIABLES	OLS		Fe	
	(1) Misp	(2) Misp	(3) Misp	(4) Misp
L.dis	0.043*** (10.48)	0.041*** (9.94)	0.033*** (8.02)	0.029*** (6.67)
L.Insize		0.001 (0.48)		0.007* (1.79)
L.Lev		0.004* (1.71)		0.069*** (3.60)
L.ROA		0.036*** (2.73)		0.010*** (3.85)
L.FC		0.001*** (3.95)		-0.002 (-0.06)
L.Big4		0.014* (1.69)		-0.021 (-1.18)
L.Dual		0.022*** (4.93)		0.003 (0.42)
L.Center		0.005 (0.91)		0.012 (1.59)
L.Ret		4.577*** (19.29)		2.826*** (14.89)
L.Concent		-0.050*** (-4.65)		-0.130*** (-4.94)
Constant	0.304*** (62.03)	0.296*** (8.51)	0.314*** (66.32)	0.188 (1.59)
N	19,534	19,534	19,534	19,534
Adj.R2	0.0055	0.0282		
Within R2			0.0042	0.0217

t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 5. Regression results of the mediating effect of institutional investors' shareholdings

	(1) Misp	(2) Ins	(3) Misp
L.dis	0.0286*** (6.67)	-0.3866*** (-5.65)	0.0257*** (6.56)
L.Insize	0.0072 (1.36)	-0.1567*** (-8.20)	0.0067 (1.26)
L.Lev	0.0687*** (3.60)	0.0850 (1.24)	0.0690*** (3.62)
L.ROA	0.0099 (0.85)	0.0727* (1.73)	0.0114 (0.97)
L.FC	-0.0000 (-0.06)	0.0000*** (13.79)	0.0000 (0.20)
L.Big4	-0.0213 (-1.18)	-0.0301 (-0.47)	-0.0215 (-1.19)
L.Dual	0.0028 (0.42)	-0.0249 (-1.03)	0.0028 (0.42)
L.Center	0.0119 (1.59)	-0.0093 (-0.35)	0.0118 (1.58)
L.Ret	2.8264*** (14.89)	1.5430** (2.27)	2.8230*** (14.87)
L.Concent	-0.1299*** (-4.94)	0.1375 (1.46)	-0.1295*** (-4.92)
Inter			-0.0069** (-2.16)
_cons	0.1881 (1.59)	4.1394*** (9.74)	0.2025* (1.70)
N	19534	19506	19506
WithinR2	0.0217	0.0226	0.0220

t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

4.3.2. Path analysis: Institutional investors

Depending on the type of stock trader, traders can be categorized into individual investors and institutional investors. Compared with individual investors, institutional investors are closer to “rational people” and therefore play the role of “stabilizer” in the market. The concept of corporate ESG performance is difficult for individual investors to pay attention to or use to build investment strategies due to its novelty, difficulty in quantification, and lack of a fixed evaluation system; whereas institutional investors are larger in scale, have enough capital to gather talents and technology, and are more likely to gain investment returns through corporate ESG performance. Therefore, institutional investors will pay more attention to corporate ESG performance and the uncertainty of ESG performance (ESG rating divergence). In general, institutional investors are able to adjust their shareholdings in company stocks by paying attention to corporate ESG rating divergence, which in turn affects the level of stock mispricing. Therefore, this paper analyzes the moderating effect of institutional investors' shareholding ratio on the relationship between ESG rating divergence and stock mispricing using institutional investors' shareholding ratio as a mediating variable.

According to the regression results in Table 5, the effect of ESG rating divergence on institutional investors' shareholding in (2) is significant, the effect of ESG rating divergence and the proportion of institutional investors' shareholding on the level of stock mispricing in (3) is significant, so the mediating effect exists significantly, and the mediating effect is a part of the mediating effect. The increase of ESG rating divergence leads to an increase in the level of stock mispricing through the direct effect. The increase of ESG rating disagreement leads to the increase of stock mispricing level through direct effect; ESG rating disagreement also leads to the increase of stock mispricing level through the indirect effect caused by the intermediary

variable of institutional investor's shareholding, which is manifested in the following way: the larger the ESG rating disagreement is, the smaller the shareholding of institutional investors is, and the decline of institutional investor's shareholding further leads to the increase of stock mispricing level. Calculations from the above regression results show that the direct effect contributes to the total effect to the extent of 89.86%, and the indirect effect contributes to the total effect to the extent of 9.32%. Overall, the direct effect plays a major role in the impact of ESG rating divergence on the level of stock mispricing.

5. Expansive Research

5.1. Moderating Effects

5.1.1. Nature of property rights

The regression results in Table 6 show that ESG rating disagreement between SOEs and private firms positively affects the level of stock mispricing, and to a greater extent in SOEs; whereas among foreign firms, there is no significant relationship. The reasons include: foreign capital is constrained by the sound ESG evaluation system in foreign countries, which focuses on authenticity and standardization, and the rating divergence is mainly caused by the differences in evaluation methods and indicators, which does not affect the stock mispricing. In contrast, China's state-owned enterprises (SOEs) and private enterprises (PTEs) are subject to an imperfect ESG disclosure system, and the disagreement reflects the information asymmetry between enterprises and investors, leading to a rise in stock mispricing. In addition, due to the image of SOEs as “big but not bad”, investors are overly optimistic about their operating conditions, and the impact of ESG ratings divergence on stock mispricing is more significant; whereas investors in private enterprises are more prudent, and when ESG ratings divergence occurs, they will adjust their investment strategies so that the stock value deviates from the intrinsic value to a lesser extent.

Table 6. Subgroup regression results distinguishing the nature of property rights

VARIABLES	State-owned Misp	private Misp	foreign Misp
L.dis	0.039*** (5.45)	0.025*** (4.13)	0.018 (0.82)
L.Insize	-0.007 (-0.74)	0.017** (2.34)	0.147*** (4.02)
L.Lev	0.067 (1.64)	0.064** (2.56)	-0.295** (-2.14)
L.ROA	-0.074 (-1.62)	0.012 (0.94)	-0.383** (-2.26)
L.FC	0.000 (0.41)	-0.000 (-0.35)	0.000 (1.14)
L.Big4	0.007 (0.29)	0.010 (0.30)	-0.313*** (-3.37)
L.Dual	0.017 (1.29)	0.001 (0.11)	0.021 (0.51)
L.Center	-0.003 (-0.27)	0.020* (1.90)	-0.012 (-0.25)
L.Ret	1.424*** (3.88)	3.190*** (12.85)	6.171*** (5.86)
L.Concent	-0.112*** (-2.64)	-0.130*** (-3.07)	-0.156 (-1.04)
Constant	0.492** (2.25)	-0.030 (-0.19)	-2.614*** (-3.25)
N	1,306	2,833	179
Within R2	0.0127	0.0275	0.1174

t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

5.1.2. Corporate ESG performance

ESG rating divergence reflects the uncertainty of corporate ESG performance and information asymmetry with investors, leading to stock mispricing. High ESG-rated firms have more truthful and complete information disclosure and lower information asymmetry; the opposite is true for low-rated firms. When analyzing the impact of ESG rating divergence on stock mispricing, different ESG performances need to be considered. Table 6 of the regression results shows that ESG rating divergence has a non-significant effect on stock mispricing in the high ESG performance group; in the low

performance group, divergence significantly and positively affects stock mispricing, with the level of mispricing expanding by 0.0482 units for every one unit increase (significant at the 1% level). The reason may be that high ESG-performing firms have strong business management and truthful disclosure of information, which mitigates the adverse effect of rating divergence; while low performing firms have poor governance and conceal information, which exacerbates information asymmetry and makes the positive effect of rating divergence on stock mispricing more pronounced.

Table 7. Subgroup regression results distinguishing ESG performance

	High ESG performance	Low ESG performance
	Misp	Misp
L.dis	0.0076 (1.21)	0.0482*** (7.18)
L.Insize	0.0021 (0.22)	0.0034 (0.44)
L.Lev	0.0039 (0.10)	0.0767** (3.17)
L.ROA	-0.0794 (-1.59)	0.0140 (1.07)
L.FC	0.0000* (1.99)	-0.0000* (-2.51)
L.Big4	-0.0247 (-0.86)	-0.0193 (-0.68)
L.Dual	-0.0044 (-0.43)	0.0121 (1.17)
L.Center	0.0115 (1.04)	0.0312** (2.68)
L.Ret	3.4645*** (12.33)	2.2879*** (8.04)
L.Concent	-0.0433 (-1.01)	-0.1549*** (-4.07)
_cons	0.3120 (1.53)	0.2499 (1.41)
N	10286	9248
WithinR2	0.0244	0.0263

t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

5.1.3. Investor sentiment

Investor sentiment can reflect the enterprise investors in a particular period of time the degree of activity, usually measured by the turnover rate. When the corporate investor turnover rate is high, it indicates that corporate investor sentiment is high at that time; while when the corporate investor turnover rate is low, it indicates that corporate investor sentiment is more depressed. In the study on the effect of ESG rating divergence on the level of stock mispricing, investor sentiment may have a moderating effect on the above effects, due to the fact that investor sentiment influences the extent to which investors react to information. The results in Table 7 show that when investor sentiment is high, the level of stock mispricing will increase by 0.0281

units for every one unit increase in ESG rating divergence, while when investor sentiment is low, the level of stock mispricing will increase by 0.0315 units for every one unit increase in ESG rating divergence. In both sets of regressions above, the effect of ESG rating divergence on the level of stock mispricing is significant at the 1% level. The above results suggest that investor sentiment does have a moderating effect on the benchmark regression results; when investor sentiment is high, investors' more frequent trading behavior can correct the stock mispricing caused by ESG rating divergence to a certain extent; whereas when investor sentiment is low, the information is difficult to be reflected in the stock price through investors' trading behavior, and thus fails to correct the stock mispricing phenomenon caused by ESG rating divergence .

Table 8. Subgroup Regression Results Distinguishing Investor Sentiment

	Emotional High Misp	Emotional Depression Misp
L.dis	0.0281*** (2.80)	0.0315*** (6.09)
L.Insize	0.0034 (0.26)	0.0138** (2.02)
L.Lev	0.0933** (2.03)	0.0717*** (3.03)
L.ROA	-0.0271 (-0.68)	0.0173 (1.29)
L.FC	-0.0000 (-0.88)	0.0000 (0.59)
L.Big4	0.0354 (0.68)	-0.0133 (-0.63)
L.Dual	-0.0112 (-0.78)	0.0158* (1.86)
L.Center	0.0164 (0.96)	0.0097 (1.07)
L.Ret	2.2202*** (6.31)	3.2487*** (12.84)
L.Concent	-0.1422** (-2.36)	-0.1105*** (-3.40)
_cons	0.2558 (0.94)	0.0261 (0.17)
N	5860	13674
WithinR2	0.0200	0.0255

t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

5.2. Robustness Tests

5.2.1. Replacing explanatory variables

In order to test the robustness of the research results, this paper first chooses to replace the measure of explanatory variables to test the robustness. Referring to Zhang Yunqi's (2023) measure of ESG rating divergence, this paper chooses

to re-measure the degree of ESG rating divergence by using the coefficient of variation of firms' ESG performance (dis1) and the difference between firms' maximum ESG rating and minimum ESG rating (dis2), respectively. The new measure of ESG rating divergence is brought into the regression model and the regression results obtained are shown in Table 9:

Table 9. Regression results after replacing explanatory variables

	(1) Misp	(2) Misp	(3) Misp	(4) Misp
L.dis	0.1412*** (9.37)	0.1234*** (8.12)	0.0168*** (11.97)	0.0162*** (11.21)
L.Insize		0.0053* (2.30)		0.0017 (0.74)
L.Lev		0.0003 (0.11)		0.0006 (0.26)
L.ROA		0.0072 (0.67)		0.0080 (0.74)
L.FC		0.0000 (1.44)		0.0000 (1.38)
L.Big4		0.0085 (0.75)		0.0071 (0.63)
L.Dual		0.0105* (2.01)		0.0101 (1.93)
L.Center		0.0071 (1.12)		0.0062 (0.98)
L.Ret		3.2466*** (17.59)		3.2892*** (17.87)
L.Concent		-0.0759*** (-4.97)		-0.0725*** (-4.76)
_cons	0.3150*** (63.55)	0.2303*** (4.47)	0.3084*** (64.32)	0.2993*** (5.75)
N	19534	19534	19534	19534
Within R2	0.0036	0.0190	0.0059	0.0215

t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

Columns (1) and (2) of the table show the regression results for dis1 and columns (3) and (4) show the regression results for dis2. The regression results show that ESG rating divergence can still have a significant positive impact on the level of stock mispricing when the measure of explanatory variables is replaced. These results are consistent with the benchmark regression results of this paper, indicating that the findings of this paper are reliable and independent of the way the explanatory variables are measured.

5.2.2. Replacing Explained Variables

According to Polk and Sapienza (2008), Junping Li and Longbing Xu (2015), manipulable accrual profits can be used as a proxy variable to measure the level of stock mispricing to measure the robustness of the research results. In this paper, we use the modified Jones model to calculate manipulable accrual profit, as a replacement variable for mispricing for robustness test. The regression results obtained after regression using manipulable accruals as explanatory variables are shown in Table 10:

Table 10. Regression results after replacing explanatory variables

	(1) Misp	(2) Misp
L.dis	0.0139*** (3.86)	0.0146*** (4.09)
L.Insize		0.0462 (1.35)
L.Lev		0.0609 (-1.25)
L.ROA		-0.0624** (-2.06)
L.FC		0.0000 (0.51)
L.Big4		-0.0076 (-0.38)
L.Dual		0.0008 (0.11)
L.Center		0.0034 (0.42)
L.Ret		1.7592*** (8.30)
L.Concent		-0.0189*** (-3.64)
_cons	0.0938*** (18.03)	1.1574*** (8.37)
N	18235	18235
WithinR2	0.0076	0.0118

t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

Column (1) of the table shows the results after regressing manipulable accruals as a proxy variable for the level of stock mispricing when no control variables are set, while column (2) shows the results after regressing ESG rating divergence on manipulable accruals with the addition of control variables. The regression results show that after replacing the measure of the explanatory variables, the regression results are still significant and the direction of the effect of ESG rating divergence on the level of stock mispricing is still positive. In summary, the above regression results are consistent with the benchmark regression results of this paper, indicating that the findings of this paper are reliable and not affected by the way of measuring the explanatory variables, and the findings are robust.

6. Research Findings and Policy Recommendations

This paper investigates the impact of the emergence of ESG rating divergence on capital market pricing efficiency. The results of the study show that, first, ESG rating divergence has a significant positive effect on the level of stock mispricing, i.e., the greater the ESG rating divergence, the greater the

level of stock mispricing. Second, ESG rating divergence can affect the level of stock mispricing by influencing institutional investors' holdings, and an increase in ESG rating divergence leads to a decrease in institutional investors' holdings and thus an increase in the level of stock mispricing. Third, among state-owned firms, ESG rating disagreement contributes significantly to the level of stock mispricing and to the greatest extent, followed by private firms, while among foreign firms, ESG rating disagreement does not have a significant effect on the level of stock mispricing. Fourth, the effect of ESG rating divergence on the level of stock mispricing is insignificant among firms with better ESG performance, while among firms with worse ESG performance, ESG rating divergence has a significant positive effect on the level of stock mispricing. Fifth, the positive push of ESG rating divergence on the level of stock mispricing is not only stronger but also more significant in the sample group with more depressed investor sentiment than in the sample group with high investor sentiment.

According to the findings of this paper, it is possible to improve the pricing efficiency of the capital market and optimize the operation mechanism of the financial market in the following three aspects: on the part of the regulators, the

first task is to establish a unified and standardized ESG rating standard in order to eliminate the differences in the assessment results caused by the current diversified ESG evaluation system, which in turn reduces the interference of the ESG rating divergence on investor decision-making and the phenomenon of stock mispricing. At the same time, regulators should encourage listed companies to actively participate in ESG practices and incentivize them to enhance ESG disclosure and performance by introducing incentives and penalties, such as tax incentives and lower loan interest rates. At the corporate level, ESG disclosure should be standardized and optimized to win market recognition based on concrete data and results. At the same time, enterprises with excellent ESG performance should appropriately promote the results of their ESG practice activities to establish a good brand image and attract more investment opportunities. On the investor side, when making investment decisions, individual investors should fully consider the impact of corporate ESG performance and ESG rating differences on stock prices, and fully understand corporate ESG reports and ratings data in order to make informed decisions. Institutional investors, on the other hand, should deepen their focus on ESG rating divergences, identify potential risk points through in-depth analysis, guide companies to improve their ESG performance and, through selective tilting of capital allocations, positively impact companies' market reputation, financing costs and long-term development. These initiatives will not only help protect the interests of investors, but also promote the market's focus on corporate ESG performance and the sustainable development of enterprises.

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