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CAN ESG PERFORMANCE IMPROVE THE ANALYST FORECAST ACCURACY?

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ABSTRACT

ESG level has become one of the important criteria for evaluating the sustainable development ability of enterprises in the new era. Based on the perspective of analysts, this paper empirically examines the influence of ESG performance on analysts' forecast accuracy. The study found that the better the ESG performance, the higher the accuracy of analysts' forecasts. Mechanism testing finds that good ESG performance can improve information transparency and reduce earnings volatility. The heterogeneity analysis shows that ESG performance has a more significant effect on the accuracy of analysts' forecasts in the samples of corporate governance level and non-state-owned enterprises. The research conclusions reveal the information transmission effect of ESG performance in the capital market and provide policy suggestions for standardizing the ESG information disclosure system.

INTRODUCTION

The United Nations Environment Programme (UNEP) first introduced the concept of ESG (Environmental, Social and Corporate Governance) in 1992, aiming to encourage enterprises to pursue shareholder wealth maximization while also considering non-financial objectives such as ethics, social equity, and environmental protection. This placed new demands on the fiduciary duties of modern enterprises, requiring them to integrate economic interests with social responsibility and adopt a strategic view of sustainable development. Since the 18th CPC National Congress, China has attached great importance to ecological civilization, promoting technologies such as resource recycling, energy conservation, emission reduction, and clean production, thereby accelerating the change in enterprise production concepts and methods. However, some enterprises have faced the dilemma of "recycling but uneconomic," where investments in resource recycling improve environmental externalities but yield limited monetary returns. Consequently, many firms, especially high-pollution and high-energy-consumption enterprises, have begun disclosing non-monetary quantitative information such as technological and environmental improvements through sustainability reports, CSR reports, and ESG reports, responding both to regulatory requirements and signaling needs under public scrutiny.

The ESG performance of enterprises has become an important reference for stakeholders to measure environmental and social benefits and has been widely valued. The Chinese government has also issued policies to standardize corporate ESG disclosure. In 2018, the China Securities Regulatory Commission (CSRC) released the Code of Governance for Listed Companies, establishing a basic framework for ESG disclosure. Driven by the "dual-carbon" goal, the State Council introduced the Reform Program of Environmental Information Disclosure System and the Format Guidelines for Disclosure of Environmental Information by Enterprises in 2021 and 2022, respectively. In July 2023, the State-owned Assets Supervision and Administration Commission (SASAC) issued the Reference Indicator System for ESG Special Reporting by Listed Companies Controlled by the Central Government.

The implementation of these policies has greatly contributed to building an ESG institutional system with Chinese characteristics and improving corporate ESG performance.

With the popularization of the ESG concept and the increase in social attention, ESG performance, as an important indicator for measuring the sustainable development ability of enterprises, integrates multi-dimensional information of enterprises in environmental input and resource utilization, social responsibility, corporate management, etc., and is able to transmit signals to the outside world about the production and operation of the enterprise and its comprehensive strength, which in turn provides a certain amount of reference value to the investment decisions of the users of the information of the capital market. Studies have verified the economic consequences of ESG performance from various perspectives, and their role mainly lies at the following three levels. The information disclosure level, as a key element in ESG information disclosure, the disclosure of environmental information has been emphasized earlier. Ren Li and Hong Che (2017) proposed a relatively perfect environmental information disclosure index system and argued that the market generally interprets the environmental information disclosed by enterprises as a signal that enterprises are facing potential environmental protection expenditures, which objectively improves the disclosure of non-financial information of enterprises. In recent years, as the ESG concept has been increasingly emphasized, the information disclosed in ESG reports meets the requirements of the economic externality theory and is a more comprehensive disclosure (Huang, 2021). In recent years, thanks to the promotion of digital transformation, the quality of ESG information disclosure has significantly improved, which has objectively promoted the transparency of corporate information (Shi & Mai, 2024). Therefore, it can be assumed that positive ESG performance improves corporate information transparency, which contributes to the reduction of financing costs, thus improving the comprehensive competitiveness of enterprises. Second, to reduce the level of corporate risk, it is found that corporate ESG scores are negatively correlated with their risks, and high-scoring companies have positive excess returns as well as relatively high Sharpe, Jensen, and Sortino ratios (Ma, 2019). Disclosure of good ESG performance can reduce the degree of information asymmetry, and under the influence of the "investor sentiment effect," it can calm investor sentiment and reduce the risk of stock price collapse (Xi & Wang, 2022). At the same time, when enterprises fulfill their commitments to stakeholders by participating in social responsibility-related activities, it helps to reduce the risk of corporate social responsibility and contract breach due to social supervision (Lian & Pu, 2024).Third, the level of corporate innovation, empirical studies have found that corporate investment in ESG performance can promote corporate innovation, and ESG not only helps to improve the quantity but also the quality of corporate innovation by alleviating financing constraints, improving the level of corporate risk-taking, and improving the innovation efficiency of employees (Fang et al., 2023). Better ESG performance can help improve the short-sighted behavior of corporate managers, enhance the ability of corporate social capital acquisition and internal control, and thus promote corporate innovation (Liu & Chen, 2024). Good ESG performance and credible ESG reports have helped enterprises obtain green credit support, which in turn promotes green innovation (Fan, 2024). Therefore, it can be assumed that in the modern society and economy, ESG performance plays an important role in enterprise management and operations.

Obviously because ESG performance is increasingly playing an important role in the enterprise and market, and attracting attention, investors also take it as an important investment basis, and analysts also need to focus on the enterprise's non-financial level of information in the environment, society, and corporate governance. The information on which analysts' surplus forecasts are based includes financial and non-financial information, and non-financial information plays a crucial role in analysts' surplus forecasts (Tan & Du, 2017): the more complete, timely, and accurate the disclosure of enterprises' non-financial information, the better the quality and quantity of information related to corporate performance that analysts can obtain and utilize (Barron et al.,1998); the higher the information transparency, the lower the surplus forecast bias (Campbell et al., 2014). Compared with traditional social responsibility and environmental responsibility, ESG performance integrates more non-financial information not covered by CSR, increasing the quantity and quality of public information available to analysts. Moreover, analysts not only need to use the future cash flow information of enterprises but also need to know the risk information of enterprises. ESG performance is a comprehensive evaluation index covering three dimensions of society, which not only provides information about future cash flows but also about the future risk of enterprises. Analysts also use ESG performance to obtain information related to firms' financial performance, thus improving analysts' forecast accuracy. Based on this, this study will examine what kind of impact corporate ESG performance has on analysts' forecasting behavior in the capital market from the perspective of integrated governance of society, the environment, and corporate governance. This paper selects A-share listed companies from 2011 to 2020 as the research sample, and analyzes the effect of ESG performance on analysts' forecasting quality, showing that: good ESG performance can significantly reduce analysts' forecast bias and forecast divergence, and improve forecast accuracy, and the above conclusion still holds after the robustness test of the propensity score matching method and instrumental variables. Mechanism tests find that ESG performance improves surplus information quality through information transparency and surplus volatility action channels, which, in turn, affects analyst forecast accuracy. Heterogeneity analysis finds that the promotional effect of ESG performance on analysts' forecast quality is more significant for better governance, more competitive industries, non-state-owned firms, and non-polluting firms. Further, we find that the positive effect of ESG performance on analysts' forecast accuracy contributes to lowering the cost of equity capital.

THEORITICALANALYSIS AND RESEARCH HYPOTHESIS

Theoretical analysis

Corporate ESG performance not only provides an information framework that integrates the three dimensions of environment, society, and corporate governance but also significantly affects its own financial performance, production, and operation decisions, providing more reliable information resources for analysts' surplus forecasting work. As an important information intermediary in the capital market, analysts' forecasting has the function of enhancing the pricing efficiency and investment efficiency of the capital market. With the frequent occurrence of social problems, such as environmental pollution and food safety, analysts pay more attention to the information of enterprises' social dimensions in their forecasting process. Fang Junxiong (2007) found that securities analysts need to obtain useful information through various channels when making surplus forecasts, and public information is less costly and the main source analysts rely on. Zhou Zhifang (2020) mentioned that corporate ESG performance helps alleviate information asymmetry, increase corporate information transparency, and enhance analysts' public information sources, improving forecast accuracy. Hu Yiming (2003) believed that in the traditional context of separation of powers, corporate executives tend to pursue short-term financial goals while neglecting long-term sustainability goals. With public attention to environmental issues increasing, corporate ESG performance attracts sustained scrutiny from institutional investors, analysts, and news media. Additionally, Wang Meiying (2021) found that enhanced ESG disclosure quality provides analysts with a more accurate basis for decision-making and reduces forecast errors. However, Huang Rongbin (2019) argues that enterprises may selectively embellish ESG performance based on legitimacy motives, affecting analysts' judgment of surplus information. Since ESG disclosure is semi-mandatory, management has discretion and may selectively disclose favorable information while concealing negative information, leading to inflated ESG performance, greater information asymmetry, and increased forecast deviation. Marquis et al. (2016) also proposed that companies may use ESG performance for impression management, increasing information confusion and reducing analysts' forecast accuracy.

PROBLEM STATEMENT

Despite the increasing emphasis on ESG disclosures and the strategic importance of ESG performance for firms, there remains insufficient empirical evidence regarding how ESG performance influences the forecast behavior of financial analysts. In particular, whether ESG performance enhances the precision and reliability of analysts' earnings forecasts in China's capital market remains an unresolved question.

RESEARCH OBJECTIVES

This study aims to empirically investigate the impact of corporate ESG performance on analysts' forecast accuracy, forecast error, and forecast divergence. Furthermore, it seeks to explore the underlying mechanisms—namely information transparency and earnings volatility through which ESG performance may exert this influence. The study also analyzes how this relationship varies across different levels of corporate governance, industry competitiveness, ownership structure, and pollution characteristics.

METHODOLOGY

Research hypothesis

In summary, ESG performance is a comprehensive reflection of firms' non-financial information, which helps promote surplus forecast accuracy, but may also increase information noise, inhibiting analysts' forecast accuracy. Based on this, the following hypotheses are proposed:

Research Hypothesis 1: The better the corporate ESG performance, the lower the analyst forecast error and forecast divergence, and the higher the forecast accuracy.

Research Hypothesis 2: The better the corporate ESG performance, the higher the analyst forecast error and forecast divergence, and the lower the forecast accuracy.

Sample Selection and Data Sources

This study selected A-share listed companies in Shanghai and Shenzhen from 2011 to 2020 as the research sample of this paper to study the impact of ESG performance on analysts' forecasting accuracy. The detailed data screening process of this study is as follows. (1) Considering the special characteristics of the listed companies in the financial category, the samples in this category are excluded accordingly. (2) Listed companies with ST and PT statuses are excluded. (3) The data with missing values for each variable are eliminated. After the above processing, a total of 18,281 observations are finally obtained. At the same time, in order to reduce the interference of outliers on the regression results, we shrink the tails at the 1% and 99% levels for all continuous variables. Among them, the data of corporate ESG ratings are from the wind database, and analyst forecasts and other financial data are from the CSMAR database.

Model setup

In order to verify the impact of ESG performance on analyst forecast quality, the analyst forecast bias model is set up at the firm level by referring to the calculation method of Guan, General Ping, and Huang, Wenfeng (2012):

$$\begin{aligned} FERROR_{it} = \alpha_0 + \alpha_1 ESG_{it} &+ \sum Controls_{it} \\ &+ \sum Year_{it} \\ &+ \sum Industry_{it} + \varepsilon_{it} \end{aligned}$$

$$\begin{aligned} FDISP_{it} = \alpha_0 + \alpha_1 ESG_{it} &+ \sum Controls_{it} \\ &+ \sum Year_{it} \\ &+ \sum Industry_{it} + \varepsilon_{it} \end{aligned}$$

In this equation, i and t represent different enterprises and years, respectively; FERROR and FDIS are the explanatory variables of analyst prediction error and prediction divergence, respectively; ESG is the core explanatory variable ESG performance; Controls represent the above control variables, and represents the disturbance term; and in order to further control for the year fixed effects as well as the industry fixed effects, the time (Year), and industry (Industry) dummy variables are set, respectively. (Industry) dummy variables are set to further control for the year fixed effects and industry fixed effects. In addition, individual-level clustered robust standard errors are selected for regression analysis.

Explained variable definition.

Referring to Huberts and Fuller (1995) study, this paper uses analyst forecast error (FERROR) and forecast divergence (FDISP) as measures of analyst forecast accuracy. Considering that a brokerage firm may send more than one securities analyst or team to make multiple forecasts for the same company, this paper only retains the last surplus forecasts of all analysts or teams of the sample company before the release of the annual report announcement of the current year, and, at the same time, excludes samples where the forecasted value of the EPS and the actual EPS are the missing values, the specific formulas for the explanatory variables analysts' forecasting errors and the degree of divergence of forecasts are as follows:

$$FERROR = \frac{|FEPS - AEPS|}{MEPS}$$

$$FDISP = \frac{Std(FEPS)}{|MEPS|}$$

Where FEPS is the mean value of analysts' forecasted EPS, MEPS is the company's actual EPS, and Std (FEPS) is the standard deviation of the analysts' forecasted EPS.

Explanatory variable definition.

At present, academics measure corporate ESG performance mainly through the scoring of third-party rating agencies or the construction of a comprehensive rating system. The CSI ESG rating system has a faster update frequency in terms of data release, a more comprehensive scope of data involved, a larger sample size, and is more in line with China's market conditions than other rating system. Therefore, the CSI ESG rating index is adopted as a measure of ESG performance, and the CSI rating results are divided into a total of nine grades, from C to AAA. Referring to Wang Linlin's (2022) quantification of ESG performance, this study assigns a score of 1-9 to the above ratings in order from grade C to grade AAA; the larger the value of the index, the better the enterprise's comprehensive governance of society, environment, and corporate governance, while adopting the Bloomberg ESG score as a proxy variable for robustness testing.

Control variable definition.

Drawing on previous related literature on the factors affecting the accuracy of analysts' surplus forecasts (Liu & Chen, 2019; Yang et al,2019), this paper controls for basic company characteristic variables, specifically, firm size (Size), gearing ratio (Lev), return on net assets (ROA), growth rate of operating income (Growth), whether it is a state-owned enterprise (SOE), analysts' forecasts number, book-to-market ratio (BM), and secondly, corporate governance variables such as the proportion of shares held by the first largest shareholder (Top1), the degree of equity checks and balances (Balance), and the occupation of funds by major shareholders (Occupy) are also controlled, while annual and industry dummy variables are introduced into models (1) and (2).

RESULTS

Descriptive statistics

The results of the descriptive statistics of the main variables in the model, in which the mean and standard deviation of analysts' forecast error in the full sample are 2.070 and 4.501, respectively, and the mean and standard deviation of analysts' forecast divergence are 1.462 and 2.944, respectively, which shows that there are large errors and divergence in analysts' surplus forecasts of the sample companies, the overall surplus accuracy is low, and there are large gaps in analysts' forecasting levels of different companies. In the full-text sample, the mean value of the explanatory variable ESG score is 6.631, indicating that the ESG performance of the sample enterprises is on average between the grades of BB-A; there is still room for further improvement: the minimum and maximum values are 1 and 9, respectively, with a standard deviation of 1.108, indicating that there is a large difference in the ESG performance of the sample enterprises. In addition, the mean value of the control variable on the nature of ownership (SOE) is 0.335, indicating that 33.5% of the listed companies in the full sample are state-owned enterprises, and the results of other control variables are basically consistent with existing studies.

Correlation analysis

The results of Pearson correlation coefficients between the variables in the model, which shows that analyst forecast error, forecast divergence, and ESG performance are significantly negatively correlated at the 1% level, which preliminarily supports the theoretical hypothesis above; that is, the ESG performance of the enterprise can significantly reduce analyst forecast error and forecast divergence, and the correlation coefficients of the model under most of the other control variables are within 0.3, which indicates that there is no strict multicollinearity problem between the variables. There is no strict multicollinearity problem.

Analysis of empirical results.

In order to verify the impact of corporate ESG performance on analysts' forecast quality, the empirical regression results based on models (1) and (2) when no control variables are added, and the regression coefficients of the core explanatory variables, ESG performance, are all significantly negative at the 1% level when the explanatory variables are analysts' forecast error and forecast disagreement, and the regression results after adding the control variables The regression results after adding the control variables and controlling for industry and year fixed effects, the regression coefficients of the core explanatory variables are still significantly negative, which indicates that the ESG performance of firms can help to improve the quality of analysts' forecasts and reduce analysts' forecast errors and forecast divergence, which may be due to the fact that better ESG performance can provide analysts with more incremental and useful information about the value of the forecasts, and significantly reduce the complexity of the forecasts, thus improving the quality of the forecasts, and thus improving the quality of the forecasts. The complexity of forecasting is significantly reduced, which improves analysts' forecast quality, verifying the research hypothesis of this study; the rest of the control variables are also basically consistent with existing studies.

Robustness check

In order to verify the reliability of the benchmark regression results in this paper, the following methodology is adopted for robustness testing:

1. Replace the measurement of the ESG performance. As the rating results of different rating agencies at home and abroad may have large differences, in order to avoid the heterogeneity of the rating agencies on the regression results caused by bias, for this reason, the use of Bloomberg information publicly released ESG scores (BLESG) as a replacement variable to regress the results of the model 1 after the replacement of the ESG performance of analysts' prediction error and prediction divergence is still at the 1% level of the significant negative The results verify that the baseline regression conclusions of this paper are robust.

2. Individual fixed effects. In order to mitigate the impact of individual company-related characteristics on ESG performance and analysts' forecast accuracy, this paper further controls for company and yearly two-way fixed effects on model (1) and (2) regression again, and the use of clustering standard errors at the individual level of the company, the results reveal that the impact of corporate ESG performance on analysts' prediction error and divergence is still significantly negative at the 1% level, consistent with the benchmark regression results. The results are consistent with the benchmark regression.

3. Instrumental variable method. To further address the endogeneity problem between ESG performance and analysts' forecast accuracy due to the existence of omitted variables, the instrumental variable method is used for robustness testing. Drawing on Wang Linlin et al. (2022), this study uses the mean values of ESG performance of other listed companies in the same industry within the same region as the instrumental variable

to conduct a two-stage least-squares (2sls) regression, and geographically proximate companies in the same industry may be affected by this regression. The ESG performance of enterprises may be affected by the industry policy, competitive environment, and social environment within the region, and their ESG performance converges. However, the ESG performance of a single enterprise does not have a direct correlation, which satisfies the setting that the instrumental variables are related to the explanatory variables, but exogenous to the explained variables. The regression results of the instrumental variables where the ESG performance obtained in the first-stage regression are all significantly negatively correlated with analysts' prediction error and prediction divergence. The results of the weak instrumental variables test show that the F-statistic is 75.873 (far more than the empirical value of 10), so the original hypothesis of the existence of weak instrumental variables can be rejected, which indicates that the selected instrumental variables are significantly correlated with the endogenous variables' ESG performance.

4. Propensity score matching. Considering that the ESG performance of enterprises may be affected by individual characteristics and the environment in which they are located, so that there may be differences in certain financial characteristics between enterprises with good ESG performance and those with poor performance, in order to avoid these differences from interfering with the relationship between ESG performance and analysts' forecasting accuracy, for this reason, the matching sample is constructed based on the propensity score matching method to ensure that the results are robust, according to the ESG performance median As the threshold value, the treatment and control groups are divided, firstly, the propensity matching score is calculated based on the control variables as covariates in this paper, and the nearest neighbor no-putback method is applied to match 1:1 based on the company's basic characteristic variables, and the results of the balanced test show that most of the standardized biases of the matching variables in the treatment group and the control group after PSM treatment are below the level of 5%, which effectively eliminates the part of the differences in the matching variables and meets the balance assumption. The balance assumption is satisfied, and the near-neighbor matched subsamples are then substituted into models (1) and (2) to regress again. The results are shown in explanatory variable ESG performance are basically the same as those before matching, indicating that after controlling for the characteristic factors affecting the ESG performance and so on, the conclusion that the higher ESG performance makes the analysts' prediction accuracy significantly higher still holds.

FUTURE STUDY

Mechanism testing

The main regression results indicate that corporate ESG performance can improve the quality of analysts' forecasts, but the mechanism of the role between the two has not been analyzed in depth. A previous study pointed out that corporate ESG performance plays an important information transfer role, which may specifically improve the quality of corporate surplus information by improving information transparency and suppressing surplus volatility, which in turn affects analysts' forecasting accuracy. In order to validate the reasonableness of the above explanations, this study Drawing on Wen Zhonglin et al. (2004), based on models (1) and (2), we construct models (3) and (4) to test the mechanism of action between the two, where Med is the mediating variable, i.e., information transparency and surplus volatility.

a. Mechanism test based on information transparency

The regression results of the core explanatory variable ESG performance are basically the same as those before matching, indicating that after controlling for the characteristic factors affecting the ESG performance and so on, the conclusion that the higher ESG performance makes the analysts' prediction accuracy significantly higher still holds.

From the level of information transparency, ESG performance, as a comprehensive carrier of non-financial information, not only reflects its overall situation in social compliance, but also covers more useful digital information in order to provide incremental usable information, enhance the public information source for stakeholders (Zhou et al, 2020), enable external stakeholders to better understand the enterprise's commitment to social responsibility and operational situations, alleviate the information gap between enterprises and external stakeholders (Wang, 2022), and increase information transparency. Second, for companies with better ESG performance, the more the management pays attention to the collective welfare of shareholders and external stakeholders and the higher the possibility of their diligence, then the self-interested behavior of the management to pursue their own interests to the detriment of the welfare of the shareholders can be effectively suppressed, thus improving the quality of corporate surplus information, contributing to the enhancement of the transparency of corporate information, and enhancing the accuracy of analysts' forecasts of corporate surplus. First of all, to test whether the ESG performance of a company can enhance the accuracy of analysts' surplus forecasts by improving the company's information transparency, we refer to the quantitative approach of Dechow et al. (2003), which is based on the Modified Jones model to calculate the absolute value of the sum of the manipulability accrual profits of the enterprise in the last three years as a measure of the information transparency of the enterprise. The larger the value of, which indicates that the enterprise's information transparency is lower. The regression results that information transparency is used as a mediating variable: ESG performance is significantly negatively correlated with the degree of accrual surplus management at the 1% level, which indicates that higher ESG ratings largely enhance firms' information transparency. Controlling for firms' information transparency, analyst forecast error, forecast divergence are significantly positively related to the degree of management of accrued surplus, and remain significantly positively related to ESG performance, and the SobelZ value is significant at least at the 1% level, with mediating effects accounting for 4.41% and 4.02%, which suggests that ESG performance can be improved by improving the firms' information transparency and thus the analysts' forecast accuracy, and information transparency is the mediating mechanism of ESG performance as an influence on analysts' forecast errors.

b. Mechanism test based on surplus volatility

From the level of surplus volatility, positive ESG performance releases the signal to the market that the enterprise is in long-term healthy development, reduces investors' concern about the uncertainty of the enterprise's future operation, further enhances its investment willingness, enables the enterprise to obtain external funds at a lower cost of financing, enhances the financial stability, and maintains the sustainability of the enterprise's surplus, which in turn reduces the interference caused by negative corporate events on analysts' forecasts, and secondly, higher ESG performance can establish good stakeholder interaction and atmosphere with external stakeholders of the enterprise, helping the enterprise to obtain external resources needed for business development from the outside, and when the enterprise encounters a negative event, these relationships and resources can be able to help the enterprise to resist the undesirable event induced performance fluctuations, and enhance the enterprise's own risk coping ability and operational ability (Xie & Zhu,2021), which results in more stable surplus information to help analysts make more accurate forecasts of enterprise performance information, reducing the possibility of analysts' valuation range expansion due to the increase in the uncertainty factors of the enterprise's future operations, and the probability of analysts' prediction bias is lower. Referring to the measurement of Lai Li (2019), the degree of Roa volatility of enterprises in three consecutive years is used as a measure of surplus volatility, and the larger the value, the worse the stability of corporate surplus. The ESG performance and surplus volatility are significantly negative at the 1% level, which indicates that higher ESG performance helps to reduce corporate surplus volatility. After controlling for corporate surplus volatility, analyst forecast error and forecast divergence are significantly negatively correlated with surplus volatility, and remain significantly positively correlated with ESG performance, and the SobelZ value is significant at least at the 1% level, with mediating effects accounting for 26.55% and 31.38%, which suggests that ESG performance can reduce surplus volatility through which in turn improves analysts' forecast accuracy, i.e., surplus volatility is ESG performance is a mediating mechanism that affects analysts' forecast errors. The above results indicate that the ESG performance of a company can enhance the accuracy of analysts' surplus forecasts by improving information transparency and reducing surplus volatility.

Heterogeneity analysis

a. Heterogeneity analysis based on the level of corporate governance

The level of corporate governance not only determines the mode of operation of enterprise production, operation, and organizational structure but is also an important institutional factor affecting analysts' surplus forecasts. Effective internal governance can provide external stakeholders with complete information on the operating status of the company, strengthen the supervision of corporate executives' surplus management behaviors, inhibit the management's opportunistic behaviors, and improve the authenticity of the quality of the surplus information, which can help analysts to make a more accurate earnings forecast. In order to verify the relationship between the role of the internal corporate governance level on ESG performance and analysts' forecast quality, referring to the method of Wang Xiongyuan et al. (2017), the corporate governance level of the enterprise is measured by whether the two positions of the chairman of the board of directors and the management are united, and the separation of the two positions of the chairman of the board of directors and the general manager can supervise and control the enterprise to a certain degree, constrain the self-interested behaviors of the executives, and ensure the independence and impartiality of the board of directors (Wang et al. 2014), the sample of two-position separation is divided into a high governance level group, otherwise it is a low governance level group, and the regression results are shown in Table 8 of Appendix, when the level of corporate governance is high, the coefficient of the impact of ESG performance on analysts' prediction error and disagreement is significantly negative at the 1% level, while it is not significant in the group of low level of corporate governance, which explains the better level of governance within the company, and the better the analysts are from the ESG performance the more information related to corporate value can be obtained by analysts and the higher the quality of analysts' forecasts.

b. Heterogeneity analysis based on the degree of competition in the industry

On the one hand, industry competition can produce information disclosure effects (Li et al, 2014), when enterprises are in a more competitive industry environment, their financing motives and needs are higher, and they may take the initiative to make more ESG disclosures to enhance information transparency to obtain more financing opportunities, on the other hand, based on the reputational mechanism, in the fierce industry competition information disclosure helps to establish a good corporate image and consolidate reputational capital and long-term value (Xiao et al., 2017), it can be expected that the more intense the competition in the industry in which the enterprise is located, the positive effect of the information advantage brought by ESG performance on the quality of analysts' forecasts will be more significant, in order to validate the role of the degree of industry competition on the relationship between the two, this paper draws on the measurement method of Kong Dongmin (2013) to take the sales revenue The Herfindahl-Hirschman (HHI) index is calculated as the market size to measure the degree of competition in the industry, and the higher the Herfindahl (HHI) index indicates that the fewer the number of firms in the industry, the less intense the competition. According to the median of the HHI index, the sample is divided into high and low industry competition groups, the regression results shows that the significant negative correlation between ESG performance and analysts' prediction error and prediction divergence is mainly reflected in the high industry competition group, and is not significant in the lower industry competition group, which suggests that the information validity of ESG performance is higher when the demand of the external information environment is more urgent.

c. Heterogeneity analysis based on the nature of property rights

In China's institutional context, state-owned enterprises (SOEs) have a strong political connection with the government and often have to set an example of social responsibility based on the national level, and their ESG information disclosure is mandatory and constraining (Wang, 2022). whereas compared to SOEs, non-SOEs maximize economic benefits as their business objectives; non-SOEs take the initiative to disclose ESG-related information, and the positive signals they convey about corporate sustainability to the outside world are more likely to attract the attention of external stakeholders and provide incremental information for analysts' forecasts. When non-SOEs actively disclose ESG-related information, their positive signals to the outside world about the sustainable development of the enterprise can attract the attention of external stakeholders and provide incremental information for analysts' forecasts. Second, compared with state-owned enterprises, the operating scale of non-state-owned enterprises is generally smaller, with lower operational transparency and institutional standardization, and a higher degree of information asymmetry (Yang & Pang,2017), which, to a certain extent, contributes to the positive role of ESG performance in reducing the degree of information asymmetry. This study expects that the enhancement of the quality of analysts' forecasts by corporate ESG performance is more significant in non-state-owned enterprises, and according to the nature of the property rights to the entire sample, is divided into SOEs and non-SOEs. The regression results of the grouping are shown in Table 10 of Appendix, which indicates that the information effect brought by ESG performance is more prominent in non-SOEs, which effectively reduces analysts' forecasting errors and improves forecasting accuracy.

d. Heterogeneity analysis based on pollution type

As the intensity of environmental regulation faced by different industries is not entirely consistent, the impact effect of ESG performance will also vary. It is found that enterprises with high environmental sensitivity tend to face higher environmental risks, and their production and operation behaviors are more likely to attract the attention and supervision of the public (Xi & Wang, 2024). Therefore, polluting enterprises will improve their ESG performance by actively carrying out activities such as green innovation or industrial transformation and upgrading, thus establishing a positive image. Therefore, polluting firms improve their ESG performance by actively carrying out activities such as green innovation, industrial transformation, and upgrading to establish a positive image.

This study expects that the ESG performance of polluting industry firms has a stronger effect on analysts' forecasts. This study divides the sample into polluting firms and non-polluting firms according to the nature of the industry, and the regression results show that the positive effect of ESG performance on improving analysts' forecasting accuracy is more pronounced in non-polluting firms, which is contrary to expectation. The reason for this result may be that, relative to non-polluting enterprises, polluting enterprises have higher external financing needs, and in order to cater to the needs of external stakeholders, such as banks and investors, they will try to communicate to them as much as possible to match the expectations and norms, while hiding the potential environmental problems, so that the ESG performance does not truly reflect the situation of the production and operation of the enterprise and increases the information error in the forecasting process of analysts.

Economic Consequences Test.

a. Based on the Cost of Equity Capital Perspective.

The previous benchmark regression results show that corporate ESG performance helps to improve analysts' forecast accuracy, which in turn provides more incremental available information for investors' investment decisions, thus improving the information environment of the capital market, while the cost of equity capital, as an important manifestation of investors' expected payoffs, is closely related to the information environment of the firms (Guo & Huang, 2021). It has been shown that a good information environment can help improve the liquidity of securities, help investors understand the current operating conditions of the company as well as its future development potential (Li, 2013), effectively alleviate the degree of information asymmetry between enterprises and investors, and further reduce the cost of equity capital. Therefore, this study takes the cost of equity capital as an entry point to further explore the economic consequences of ESG performance on analysts' forecasting accuracy. This study draws on the mediation effect test of Wen Zhonglin et al. (2004) to construct the following regression model:

$$PEG_{i,t} = \gamma_0 + \gamma_1 ESG_{i,t} + \sum \delta_1 Controls_{i,t} + Year + Industry + \xi_{i,t}$$

$$\mathrm{PEG}_{i,t} = \delta_0 + \delta_1 ESG_{i,t} + \frac{\mathrm{Ferror}_{i,t}}{\mathrm{Fdisp}_{i,t}} + \sum \delta_1 Controls_{i,t} + \xi_{i,t}$$

Referring to the practice of Mao Xinxu (2012), the cost of equity capital of the firms is measured based on the PEG model, and the larger the value indicates that the higher the cost of equity capital of the firms, and the rest of the control variables are consistent with the previous paper, the regression results show that ESG performance is significantly negatively correlated with the cost of equity capital, and the better the ESG performance of the firms, the lower the cost of equity capital is, and the regression coefficients of the analysts' forecasting The regression coefficients of forecast error and forecast divergence are significantly positive, and the coefficients of ESG performance are both significantly negative, and the Z-statistic of the sobel test is significant at the 1% level, which indicates that there is a partially mediating effect of analyst forecast accuracy between ESG performance and the cost of equity capital, i.e., the improvement in the information environment induced by the firm's ESG performance reduces the cost of equity capital.

CONCLUSION AND IMPLICATION

Conclusions

This paper explores the information transfer effect of ESG performance from the perspective of analysts' forecasting, and selects A-share listed companies in Shanghai and Shenzhen from 2011 to 2020 as the research samples to examine the impact and mechanism of fulfilling ESG responsibilities on analysts' forecasting in China's economic environment. The results show that the better the enterprise's ESG performance, the higher the analysts' forecasting accuracy. The mechanism test shows that ESG performance improves surplus information quality by improving information transparency and reducing surplus volatility. The heterogeneity analysis finds that the relationship is more significant in firms with high governance levels, more competitive industries, and non-SOEs and non-polluting firms. The economic consequences test shows that the increase in analyst forecast accuracy caused by firms' ESG performance contributes to a decrease in the cost of equity capital.

Implications

Based on the above conclusions, this study draws the following insights: From the perspective of analysts' prediction, it verifies that ESG performance can transmit information related to enterprise business performance to the capital market; from the perspective of the long-term development of enterprises, ESG performance plays an important role in reducing the degree of information asymmetry and maintaining profitability stability; therefore, enterprises should implement the ESG concept in their daily production and operation, improve information transparency, strengthen communication with external stakeholders, and accumulate resource strength and comprehensive competitiveness. For government regulators, high-quality information disclosure can further enhance information transparency and realize the information value effect. Given that China's corporate ESG information still belongs to the "semi-compulsory" disclosure model, it is necessary to promote ESG disclosure through the joint efforts of government authorities and third-party institutions, adopt incentives and mandatory measures, and perform synergistic supervision. Specifically, government departments can improve information disclosure policies, establish comprehensive ESG evaluation systems, and strengthen information sharing among regulators and investors to provide more timely and accurate references for investment and financing decisions; at the same time, enterprises with better ESG performance should be given policy preferences such as tax incentives and financing support. For the capital market information intermediary, analysts need to obtain different information from a variety of channels and timely process it to publish to the outside world; thus, analysts are required to fully identify and utilize the information publicly released by enterprises and focus on corporate ESG performance, incorporating it into comprehensive evaluation indices to improve the quality of prediction and work efficiency, and to provide reliable information for external investors' decision-making.

REFERENCES

Barron, O., Kim, O., Lim,S., & Stevens,D.(1998). Using analysts' forecasts to measure properties of analysts' information environment.*The Accounting Review*,73(4),421-433.

Campbell,J.L.,Chen,H.,Dhaliwal,D,S.,Lu,H.M.,&Steele,L.B.(2014).The information content of mandatory risk factor disclosures in corporate filings.*Rev Account Stud* ,19,396–455.

Dechow,P.M., Richardson,S.A., &Tuna,I.(2003) Why Are Earnings Kinky? An Examination of the Earnings Management Explanation. *Review of Accounting Studies*, 8(2-3),355-384.

Fan,Y. (2024). How ESG rating divergence affects corporate green innovation. *Friends of Accounting* ,(21):,81-89.

Fang,X.,&Hu,D. (2023). Corporate ESG performance and innovation-evidence from a-share listed companies. *Economic Research* ,58 (02) ,91-106.

Fang,J.,&Hong,J. (2007). Listed company disclosure quality and securities analysts' earnings forecasts. *Securities Market Herald* ,(03) , 25-30.

Guan,Z.,&Huang,W. (2012). Securities analyst characteristics, conflicts of interest, and surplus forecast accuracy. *China Accounting Review* ,10 (04), 371-394.

Guo,Z.,&Huang,J. (2021). High-speed rail time-Compression effect and firms' cost of equity capital-Empirical evidence from A-share listed companies. *Financial Research*, (07),190-206.

Huang,S.(2021).Three theoretical pillars supporting ESG.*Finance And Accounting* ,(19) ,3-10.

Huang,R.,Chen,W.,&Wang,K. (2019). External financing demand, impression management, and corporate drift green. *Comparison Economic and Social Systems* ,(03) , 81-93.

Hu,Y., Lin,W.,&Wang,W. (2003). Information sources, domains of interest, and analytical tools of securities analysts. *Financial Research*,(12),52-63.

HHuberts,L.C,Fuller,R.J.(1995).Predictability bias in the US equity market.*Financial Analysts Journal*,51(2),12-28.

Kong,D.,Liu,S.,&Wang,Y. (2013). Market competition,property rights and government subsidies. *Economic Research* , 48 (02) , 55-67.

Lai,L., Tang,Y., Xia,X.,&Ma,Y. (2019). Does directors' and officers' liability insurance reduce corporate risk? -Based on the perspectives of short-term lending and credit access. *Management World* ,35 (10), 160-171.

Li,S. (2013).The moderating effects of diversification, surplus volatility and corporate governance. *Journal of Shanxi University of Finance and Economics* , 35 (12), 104-112.

Li,X.,Zhang,R.,&Dong,H. (2014). Debt litigation and the risk of stock price collapse. *China Accounting Review* ,12 (02) , 133-158.

Lian,Y., &Pu,Y. (2024). ESG performance and corporate business credit supply. *Finance and Accounting Monthly* ,45 (22) ,37-43.

Liu,J., &Xu,Y. (2024). ESG performance and corporate resilience. *Auditing and Economic Research* , 39 (01), 54-64.

Liu,Q., &Chen,S. (2019). the secret message: management guidance and analysts' surplus forecast errors. *Nankai Management Review* ,22 (05) , 207-224.

Ma,X. (2019). Does ESG investment strategy have demining function? --an empirical study based on China's A-share market. *North Finance* ,(05),14-19.

Mao,X., Ye,K., &Zhang,D. (2012). Measuring and evaluating the cost of equity capital of listed companies--An empirical test based on China's securities market. *Accounting Research* ,(11),12-22+94.

Marquis,C, Toffel,M.W, Zhou,Y. (2016).Scrutiny, norms, and selective disclosure: A global study of greenwashing.*Organization Science* ,27(2),483-504.

Ren, L., &Hong, C. (2017). A study on the impact of environmental information disclosure on firm value. *Economic Management* ,39 (03),34-47.

Shi,Q., &Mai,Y.(2024). The impact and mechanism of digital attention on corporate ESG performance-the mediating effect of disclosure quality and resource allocation efficiency. *Science and Technology Progress and Policy* ,1-12.

Tan,X.,&Du,X. (2017). Internationalized boards, analyst attention and cash dividend distribution. *Financial Research* , (08) ,192-206.

Wang,B. (2022). Research on the influence mechanism of venture capital on enterprise innovation performance. *Suzhou University*.

Wang,J.,Cheng,B.,&Sun,Y. (2014). The effect of expected performance feedback effect on corporate R&D and charitable giving behavior. *Management World* ,(08),115-133.

Wang,L.,Lian,Y.,&Dong,J. (2022). A study on the mechanism of ESG performance on enterprise value. *Securities Market Herald* ,(05) ,23-34.

Wang,M., Fu,N., Huo,Y., &Cao,Y. (2021). does state auditing affect the accuracy of analysts' surplus forecasts? *Audit Research* ,(05), 61-71.

Wang,X.,Li,Y.,&Xiao,M.(2017). Does annual report risk disclosure help improve analysts' forecast accuracy? *Accounting Research* ,(10), 37-43+96.

Wen,Z., Zhang, L., Huo,J., &Liu,H. (2004). Mediation effect test procedure and its application. *Accounting Research* , (05),614-620.

Xi,L., &Wang,Y. (2024). corporate esg disclosure and stock price crash risk. *Economic Issues* , (08),57-64.

Xiao,S.,Luo,M.,&Zhang,Y. (2017). Variability of decision-Making mechanism of voluntary corporate disclosure-A comparative study based on different eras and market structures. *Economic Management* ,39(06),86-100.

Xie,X.,&Zhu,Q. (2021). Research on the mechanism of compliance and strategic green innovation on corporate green image: Based on the optimal distinction theory perspective.*Research and Development Management* ,33 (04), 2-14.

Yang,C., &Pang,R. (2017). Contractual environment, financing constraints and the "Signal weakening" effect: An empirical study based on Chinese manufacturing firms. *Management World* , (04),60-69.

Yang,Q.,Ji,Y.,&Wang,Y. (2019). can high speed rail improve the accuracy of analysts' surplus forecasts? --Evidence from listed companies. *Financial Research* ,(03),168-188.

Zhou,Z., Liu,J., &Zeng,H. (2020). The effect of water disclosure on the level of corporate risk taking - Evidence from a high water risk industry. *Research in Environmental Economics*, 5 (04), 54-74.