

Article

Does the ESG Rating Inhibit the Productivity of Companies?

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Abstract

ESG rating has become a key factor influencing its perception and decision-making of companies, but there are significant differences in the rating results of ESG rating agencies. Current research mainly focuses on the economic impact of ESG rating divergence, while insufficient attention has been paid to their impact on corporate growth capabilities. This article is based on the perspective of stakeholders and uses A-share-listed companies in China from 2016 to 2023 as research samples to empirically analyze the correlation mechanism between ESG ratings, rating divergence, and corporate productivity. Research has found that higher ESG ratings are associated with higher corporate productivity, but significant differences in ESG ratings weaken this effect. This conclusion remains valid in robustness tests and addressing endogeneity issues. The mechanism test confirms that ESG rating divergence exacerbates financing constraints and managerial short-termism, thereby reducing corporate productivity. Further analysis shows that the negative impact of ESG rating divergence is more pronounced in companies with better information environments and ESG information disclosure with lower quality. Moreover, compliance with the GRI disclosure framework and providing independent environmental reports are effective methods of improving ESG. These findings contribute to the optimization of ESG rating management and corporate information governance, providing empirical evidence on the economic consequences of ESG rating divergence in emerging capital markets.

Keywords: ESG rating; ESG rating divergence; corporate productivity; total factor productivity



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1. Introduction

With profound impacts on humanity's future, climate change is no longer a distant risk but an evolving severe crisis [1]. It has affected all aspects of human life [2,3], and also inflicts irreversible damage on environmental sustainability and worsen human living conditions [4]. Against this backdrop, net-zero emissions has become a global policy consensus to mitigate climate warming [5]. Numerous countries worldwide have committed to net-zero emissions goals. As the world's second-largest economy and the top carbon emitter, China ranked 156th in Yale University's 2024 Environmental Performance Index (EPI). This index evaluates and ranks the ecological performance of 180 countries; this ranking highlights the particularly acute contradiction China faces between environmental pollution and economic development. In response, a series of environmental regulatory policies have been rolled out in China [6] and policies on ESG information disclosure in China have been intensively introduced, whereas China has pledged to reach net-zero emissions by 2060 that marks an important advance in global climate governance [7,8].

With rising global attention to the concept of sustainable development, ESG (environmental, social, and governance) standards have emerged as a critical indicator for

measuring corporate sustainability and long-term value [9]. ESG refers to the integration of environmental, social, and corporate governance dimensions into investment management decisions, while monitoring and regulating corporate behavior to achieve a balance between economic benefits and sustainable development. As a form of non-financial disclosure, ESG mainly conveys signals to society that companies prioritize environmental protection, fulfill social responsibilities, and actively strengthen corporate governance. This helps mitigate moral hazard, adverse selection, and agency problems caused by information asymmetry [10]. It fosters a positive corporate image, enhances stakeholder confidence in the company's long-term development, and makes it easier to obtain resources from partners to improve value creation. However, considerable divergences among ESG rating agencies regarding rating standards, frameworks, and weighting methodologies [11] have resulted in a significant variation in the scores assigned to the same company. ESG rating divergence is particularly pronounced in emerging markets like China [12]. Moreover, as the regulatory framework of China is evolving, different sectors operate different ESG disclosure mandates, resulting in substantial variability of disclosure practices [13]. To compound this challenge, divergences in ESG ratings (driven by differing assessment criteria among agencies) heighten information uncertainty and weaken the assumed financial advantages of robust ESG performance [14,15]. Existing research primarily focuses on the economic implications of ESG rating divergence: stock returns suffer [12,16]; analyst forecast errors rise [17]; a risk of stock price collapse [18]; audit fees increase [19]; and market pressures on managers intensify [20], with limited attention to its effects on the company's comprehensive development. This study aims to fill this gap by focusing on total factor productivity (TFP).

Corporate productivity reflects the maximum output generated by inputs such as capital, labor, technology, management, and organization. The key to its improvement lies in the improvement in resource allocation efficiency and technological progress [21]. However, in order to achieve configuration optimization, technological innovation and industrial upgrading require not only relying on the operational and management capabilities but also indispensable support from capital markets. ESG, as an investment approach for companies to fulfill their sustainability commitments, can influence internal production operations while also helping businesses build external reputations and attract more resources. However, there are significant differences in the ratings of the same company by different ESG rating agencies [22]. Divergence in ESG ratings not only weakens the authenticity and reliability of rating results, but also has a negative impact on the decision-making of managers and investors, thereby affecting corporate productivity. The impact of ESG rating divergence on corporate productivity may be reflected in two aspects: First, ESG rating divergence increases the uncertainty and complexity of companies, causing unease among investors who rely on this data for decision-making [23,24], exacerbating risk perception, distracting attention, triggering emotional volatility, and causing decision paralysis [22]. Under such unstable sentiment, investors may mitigate their own risks by reducing investments in the company and increasing financing costs. Consequently, the degree of financing constraints on the company rises, thereby affecting its productivity. Second, ESG rating divergence, as a negative impact event, increases the reputation risk for both the company itself and the management. To avoid substantial reputational damage, management develops strong short-termism motivation. Furthermore, ESG rating divergence undermines information transparency and increases agency costs, creating conditions for managerial short-termism that similarly impedes corporate productivity. Therefore, understanding the mechanisms through which ESG rating divergence impacts corporate productivity and whether these effects exhibit distinct characteristics across varying corporate information environments holds significant theoretical and practical implications.

This study is based on signal theory and stakeholder theory, using data from Chinese A-share-listed companies from 2016 to 2024 as the research sample, to explore the relationship between ESG ratings and corporate productivity. Research has found that ESG ratings significantly improve corporate productivity by reducing information asymmetry between companies and stakeholders. This is because ESG ratings assist stakeholders in assessing the sustainability of a company's financial performance and its value. However, the divergence in ESG ratings increases the cost and difficulty for stakeholders to utilize ESG ratings, which may interfere with investor decisions and affect the degree of corporate financing constraints; at the same time, the divergence of ESG ratings weakens the supervision of ESG ratings, exacerbates management's short-termism, and ultimately exacerbates management's short-sighted behavior, and ultimately weakens the productivity-enhancing effect of ESG ratings. Further analysis shows that the impact of ESG ratings and their divergence on corporate productivity is mainly reflected in companies with higher-quality ESG-related report disclosures. This suggests stakeholders cross-verify information through multiple channels. The influence of ESG ratings and their divergence on Total Factor Productivity (TFP) is concentrated in companies with higher financial transparency—meaning the impact of non-financial information is more significant in companies operating with better financial information environment.

Compared with the existing literature, this paper's potential incremental contributions are as follows: In terms of research content, most existing studies on ESG rating divergence focus on corporate performance and pay less attention to their impact on corporate productivity. This paper links ESG ratings, rating divergence, and their interactive effects with productivity, can deeply analyze their relationships. In addition, this paper examines the mechanism by which ESG rating divergence affects corporate productivity from the perspectives of financing constraints and management short-termism. It emphasizes that ESG rating divergence weakens the positive impact of ESG ratings on corporate productivity by exacerbating financing constraints and management short-termism. From a research perspective, this paper examines the impact of ESG rating divergence on corporate productivity through the lens of varying information environments, revealing heterogeneous effects under different conditions. We found that when the quality of ESG-related report disclosure is low and the overall information environment is good, the impact of ESG rating and ESG rating divergence on corporate productivity is more significant. The heterogeneity in information interrelationships identified in this article holds significant implications for integrating and utilizing diverse sources of financial and non-financial information. Furthermore, these findings broaden the academic discourse on the role of ESG in corporate sustainability and provide strategic guidance for management and decision-makers.

The rest of the paper is organized as follows: The literature review and hypotheses are developed in Section 2. Section 3 discusses the sample selection, statistics, and the empirical model. Then, Section 4 presents the main empirical results, robustness tests, and heterogeneity analyzes. Section 5 is mechanism tests. The final section highlights the practical significance and conclusions of this study.

2. Theoretical Background and Hypotheses

2.1. ESG Performance and Total Factor Productivity

Corporate productivity depends on both internal capabilities and external environmental factors. In addition to being influenced by technological innovation [25], scale [26], and the legal environment [27], characteristics such as state-owned economic structure, government taxation, market competition, and financing constraints also significantly constrain corporate productivity. Therefore, whether a company can obtain stakeholder support in terms of resources is crucial for enhancing growth. However, companies are

generally reluctant to fully disclose their competitive advantages, expected risks, and non-financial information to the market. Even such information may be selectively presented when disclosed, resulting in information asymmetry which imposes high costs on stakeholders for searching and identifying corporate information, greatly increasing risk expectations. And this also constrains stakeholders' support for corporate resources, hindering the enhancement of corporate value. By releasing positive signals through ESG ratings, companies can attract market attention and reduce information asymmetry with stakeholders such as employees, suppliers, customers, banks, and regulatory agencies. This enhances their ability to integrate and acquire resources, thereby helping to improve corporate productivity.

ESG rating has become an important tool for measuring a company's long-term value, enhancing the stability of stakeholder relationships, and fostering a positive corporate image. This attracts potential resources and demand, improving corporate productivity. From the perspective of stakeholder theory, corporate development relies on the support and participation of all stakeholders. ESG ratings satisfy stakeholders' growing demand for non-financial information [27], effectively mitigate agency problems, attract more investors, and help companies accumulate relational capital. Establishing and maintaining strong trust between companies and external stakeholders can enable long-term stable partnerships, access to diverse external knowledge and complementary resources, enhance innovation absorption capacity for higher-level innovation activities [28,29], thereby improving their production efficiency. By balancing stakeholder interests, ESG disclosure facilitates the reallocation of development resources, reduces capital costs [30], and secures government subsidies or policy support [31–33], thereby improving corporate efficiency.

From a signaling theory perspective, ESG disclosure conveys signals to stakeholders that the company has promising development prospects and is trustworthy. ESG ratings can help management to more comprehensively assess the situation faced by the company, reduce personal-interest-driven overinvestment, and allocate limited resources to more efficient projects, thereby improving investment efficiency [34]. Consequently, companies may have increased capital available for production or innovation [30], thereby increasing output. Moreover, companies with ESG advantages are more attractive to job seekers. Companies can leverage competitive advantages gained through social activities to attract talent, elevate human resource quality, and thereby enhance production efficiency. Companies with good ESG performance demonstrate greater commitment to employee welfare, diversity, and equal opportunities. This fosters employee creativity, willingness to contribute to the organization, and self-actualization, mitigating agency problems to some extent and enhancing collaborative efficiency. The first hypothesis is proposed:

Hypothesis 1. ESG ratings have a positive impact on corporate productivity.

2.2. ESG Rating Divergence and Total Factor Productivity

ESG rating, as an important communication tool between companies and stakeholders, alleviates the problem of information asymmetry with external stakeholders to reduce the information cost while broadening oversight channels for corporate operations and development. However, ESG rating services are provided by different third-party professional agencies, and coupled with the proliferation of ESG rating agencies, each agency adopts different methods and data sources, resulting in significant differences in the ESG ratings of the same company [35]. The differences in ESG ratings weaken the comparability of ESG data [36], reflecting rating agencies' uncertainty regarding listed companies' ESG performance. Furthermore, investors' reactions to negative ESG disclosures are often stronger than positive disclosures [37], which may lead to an increase in market risk perception and

an expansion of return volatility, thereby having a negative impact on the decision-making behavior of stakeholders such as managers, investors, and other stakeholders. Such effects constrain corporate development opportunities and financing channels, ultimately limiting corporate productivity.

Divergence in ESG ratings generate a significant “noise effect” [11], which partially diminishes the “informational effect” of ESG ratings. This increases the degree of information asymmetry and heightens investors’ search costs for a company’s true performance. Given that assessing corporate capabilities remains a primary challenge [38], ESG ratings increasingly influence investment strategies and corporate behavior. When there is significant divergence in ESG rating among different institutions [35], ESG rating divergence is interpreted as uncertainty in the non-financial performance of companies in the eyes of ESG rating agencies [22,36]. The divergence of ESG ratings conveys redundant information to investors, which forces stakeholders to invest additional costs in information verification and evaluation [39], thereby exacerbating information asymmetry between companies and stakeholders. This has intensified external doubts about the debt repayment ability and sustainable operations. Investors may mitigate their own risks by reducing investments in the company or increasing financing cost. Ultimately, this makes it more difficult for companies to obtain capital support or policy support from multiple stakeholders, thereby suppressing productivity growth.

Furthermore, ESG rating divergence is often interpreted as signals of environmental information manipulation and opportunistic behavior [39,40]. This is due to the information masking effect formed by ESG rating divergence through signal interference mechanisms, exacerbating agency conflicts between management and stakeholders, weakening supervision over executives, and encouraging managers to conceal profit manipulation behavior [24]. ESG rating divergence provides managers with an excuse to cover up unethical behavior. This opportunistic behavior may weaken the trust of stakeholders in the company [40], leading to fluctuations in investor confidence and subsequently weakening the effectiveness of ESG driven investment strategies [22]. Moreover, ESG rating divergence may affect corporate reputation. Once a company’s reputation is damaged, not only the company itself, but also the management as a reputation community, will suffer significant reputation losses. This induces management toward short-termism decision-making, thereby hindering corporate productivity. Therefore, divergent ESG ratings amplify opportunistic risks and increases agency conflicts, ultimately suppressing corporate productivity.

Existing research mainly centers on developed markets like the United States and the European Union, with ESG frameworks supported by mature regulatory systems and standardized disclosure requirements. Conversely, emerging markets like China exhibit a distinct institutional context, with ESG-financing linkages shaped by fragmented regulatory supervision and inconsistent enforcement. Notable sectoral and regional disparities define China’s ESG landscape, arising from inconsistent regulatory intensity, differentiated policy mandates, and variations in the institutional capacity of local regions. For example, high-emission sectors like energy and heavy manufacturing must comply with stricter ESG disclosure requirements under state environmental targets. Meanwhile, service-focused sectors often follow weaker or voluntary guidelines [41]. Regionally, first-tier cities such as Beijing and Shanghai leverage more robust regulatory enforcement and ESG infrastructure, while inland provinces fall behind in terms of disclosure quality and third-party ESG verification systems [42]. These weak or inconsistent regulations lead to significant information asymmetry and rating inconsistency, impeding capital providers’ ability to evaluate ESG risks and returns of individual companies, thereby exacerbating the negative impact of ESG rating divergence on corporate productivity. Moreover, considering Chinese social cultural traditions such as Confucian culture, companies may be more inclined to assume

so-called “implicit” social responsibilities, which may not necessarily be disclosed through formal channels. This information asymmetry leads to differences in the views of different rating agencies on corporate ESG performance, thereby increasing rating differences [42]. Based on those, this article proposes the following hypothesis:

Hypothesis 2. ESG rating divergence may suppress the positive impact of ESG ratings on corporate productivity.

3. Research Design

3.1. Sample Selection and Data Sources

Our initial sample includes A-share companies listed in China’s Shanghai and Shenzhen exchanges from 2016 to 2024. Intensive policies regarding environmental information disclosure for listed companies in China started to be densely issued in 2015. Therefore, data starting from the following year 2016 was adopted. Based on the existing literature, we apply the following screening process to the initial sample. We exclude (1) samples where firm-year ESG rating data are sourced from fewer than two ESG rating agencies; (2) samples from the financial and insurance sectors; (3) ST, ST*, and PT listed companies with abnormal transactions; (4) samples with missing data in the main variables. We use winsorization on continuous variables at the 1% level to reduce the impact of outliers. The final dataset contains 24,551 distinct observations at the firm-year level.

3.2. Variables Chosen

3.2.1. Total Factor Productivity (TFP)

Total factor productivity (TFP) measures the efficiency of converting input factors into output in production. It represents the average output level of input factors, which is considered as a reflection of the overall effectiveness of a company; TFP is seen as a broad gauge of corporate performance. The Levinsohn–Petrin (LP) [43] approach is frequently used to estimate TFP in research [44]. The LP method uses intermediate inputs (such as material consumption) as a proxy for enterprise production efficiency to solve the endogeneity problem and protect sample sizes [45], thereby providing more accurate TFP estimates. The relevant mathematical expression of Levinsohn–Petrin (LP) is as follows:

$$\ln Y_{i,t} = \alpha_0 + \alpha_L \ln L_{i,t} + \alpha_K \ln K_{i,t} + \alpha_M \ln M_{i,t} + \varepsilon_{i,t} \quad (1)$$

where $Y_{i,t}$ is total output of company i in year t . L is labor input, measured by the number of employees. K is capital inputs, measured by the net value of fixed assets. M is the intermediate input, measured by operating expenses, combined with operating revenue, selling expenses, management expenses, financial expenses excluding depreciation and amortization, employee compensation, and other cash expenditures related to employees. $\varepsilon_{i,t}$ is the residual term.

3.2.2. ESG Performance

The selection of an appropriate ESG is a challenging process, not because there are few options, but rather because the available systems are abundant. The number of third-party rating agencies has increased significantly in recent years, numbering in the hundreds. The international ESG rating systems are typically based on the characteristics of European or American companies, which are significantly different from those of Chinese companies [46]. The domestic rating system is more relevant [47]. Although global rating agencies employ consistent methodologies to satisfy investors’ demands for comparability, this approach may lead to a decrease in the relevance of the information provided. Regarding ESG ratings in China, ESG ratings were mostly provided after 2018 or CSR ratings were provided before

that. In order to ensure the reliability and continuity of the conclusions, cover most Chinese A-share-listed companies and provide more comprehensive data, the article employs three local rating systems (Huazheng ESG Index, SynTao Green Finance ESG Index, CNRDS ESG Index) and one foreign rating system (Bloomberg ESG) to measure the ESG performance (ESG_PER) of Chinese listed companies. These institutions cover authoritative ESG rating providers both domestically and internationally, widely recognized by academia and industry [39,40,48]. ESG_PER is the rating assigned by different ESG rating agencies to each company, which takes the median of the standardized ratings of different rating agencies for the same company in the same year. The larger the value, the better the rating result and the higher the ESG performance. Referring to [36], in order to make the ratings of different agencies comparable, the annual ratings of each rating agency are first standardized to have a mean of 0 and a standard deviation of 1. The specific calculation method is as follows:

$$ESG_PER_{i,t} = Med(STD_ESG_{j,i,t}) \quad (2)$$

where STD-ESG is the standardized ESG performance of ratings from various rating agencies. Specifically, referring to [22,36], if the agency only provides ratings, the ratings are first converted into scores in sequential order. For example, Huazheng's ESG rating is divided into nine levels, with ratings ranging from 1 to 9 from C, CC, CCC, B, BB, BBB, A, AA, and AAA; then, standardize the annual ratings of each institution using a mean of 0 and a standard deviation of 1. Med (STD_SG) is the median standardized ESG performance of a company for a given year by all participating rating agencies.

3.2.3. ESG Rating Divergence

ESG rating divergence (ESG_DIS) refers to the rating divergence among ESG rating agencies among different rating agencies for the same company in the same year. Referring to [24,36], using the standard deviation of ESG ratings of the same company by different rating agencies measures ESG Rating divergence. The calculation method is as follows: Firstly, choose Huazheng ESG index, SynTao Green Finance ESG index, CNRDS ESG index and Bloomberg ESG index. Secondly, in order to ensure comparability of ESG ratings among various rating agencies, the original ratings of each rating agency are first standardized. To ensure the integrity of the sample data, samples of listed companies that have only obtained a single ESG rating will be excluded. Finally, take the standard deviation of ESG ratings from all rating agencies as a proxy variable for the divergence of corporate ESG ratings. The specific calculation method is as follows:

$$ESG_DIS_{i,t} = Std(STD_ESG_{j,i,t}) \quad (3)$$

where STD_ESG is the standard deviation of the standardized ESG performance of a company for a given year by all participating rating agencies.

3.3. Model Specification

To investigate the relationship between ESG rating divergence and total factor productivity of companies, this chapter constructs the following regression model:

$$TFP_{i,t} = \beta_0 + \beta_1 ESG_PER_{i,t-1} + Controls_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (4)$$

$$TFP_{i,t} = \chi_0 + \chi_1 ESG_PER_{i,t-1} + \chi_2 ESG_DIS_{i,t-1} + \chi_3 ESG_PER_{i,t-1} \times ESG_DIS_{i,t-1} + Controls_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (5)$$

where i and t denote firm and year, respectively; TFP is the company's total factor productivity, measured using the LP model; and ESG_PER and ESG_DIS measure the different

dimensions of ESG ratings. Referring to articles such as [49–51], controlling for company size (SIZE), growth (GROWTH), turnover rate (TURN), equity structure (FP), return on assets (ROA), debt-to-equity ratio (LEV), and cash flow (CASHFLOW) are variables that reflect the company's basic condition, financial characteristics, and governance characteristics. In addition, the model also controls for fixed effects of year and industry. All the variables are defined previously in Table 1.

Table 1. Variables description.

Symbol	Variable	Definition
TFP	Total factor productivity	Obtained by LP method measurement
ESG_PER	ESG performance	Median of annual standardized ratings across different ESG rating agencies
ESG_DIS	ESG rating dispersion	Standard deviation of annual standardized ratings across different ESG rating
SIZE	Company size	Natural logarithm of total assets
GROWTH	Growth rate	Growth rate of operating revenue
TURN	Turnover rate	Annual average turnover rate
FP	Shareholding concentration	Ratio of shares held by the largest shareholder
ROA	Firm assets	The return on total assets
LEV	Leverage ratio	The ratio of liabilities to total assets
CASHFLOW	Cash Flow	The ratio of net cash flow from operating activities to total assets

4. Results

4.1. Descriptive Statistics

The descriptive statistical results in Table 2 show that the maximum value of the total factor productivity (TFP) of the sample companies is 85.68, the minimum value is 18.67, and the average value is 30.23. The mean of ESG performance (ESG_PER) is -0.222 , and the variance is 0.348. The ESG performance's minimum value is -1 and the maximum value is 0.143, indicating that the ESG performance of listed companies are uneven. The mean of ESG divergence (ESG_DIS) is 0.723, the difference between the maximum and minimum values is 1.143, indicating that the divergence of different ESG rating agencies to the same company vary widely.

Table 2. Descriptive statistics of major variables.

Variable	Obs	Mean	Std. Dev.	Min	Max
TFP	24,564	30.23	18.76	18.67	85.68
ESG PER	24,564	-0.222	0.348	-1	0.143
ESG_DIS	24,564	0.723	0.199	0.164	1.021
SIZE	24,564	14.4	6.101	8.854	25.55
GROWTH	24,556	0.139	0.382	-0.587	2.199
TURN	24,564	1.378	1.312	-0.434	6.476
FP	24,564	0.321	0.145	0.079	0.721
ROA	24,563	0.028	0.071	-0.285	0.204
CASHFLOW	24,559	0.05	0.065	-0.135	0.239
LEV	24,564	0.425	0.2	0.063	0.912

4.2. Empirical Results and Analysis

Table 3 Columns (1) and (2) show that the coefficients of ESG_PER are both positive and significant at least at the 1% statistical level, indicating that higher ESG_PER is associated with higher total factor productivity for the company. The coefficients of ESG rating level in

column (1) and column (2) are 1.920 and 2.363, respectively. ESG rating information is more useful for companies with higher ESG rating level. The above results support Hypothesis 1.

Table 3. Regression results.

Variable	(1)	(2) ALL TFP	(3)	(4) High ESG_DIS	(5) Low ESG_DIS
ESG_PER	1.920 *** (0.106)	2.363 *** (0.101)	2.425 *** (0.103)	2.210 *** (0.130)	3.058 *** (0.171)
ESG_DIS			−0.479 *** (0.132)		
ESG_PER × ESG_DIS			−0.331 * (0.198)		
SIZE		2.520 *** (0.036)	2.525 *** (0.036)	2.471 *** (0.050)	2.604 *** (0.058)
GROWTH		0.399 *** (0.050)	0.396 *** (0.050)	0.310 *** (0.061)	0.575 *** (0.088)
TURN		0.246 *** (0.015)	0.242 *** (0.015)	0.270 *** (0.020)	0.181 *** (0.019)
FP		0.271 * (0.154)	0.291 * (0.154)	0.256 (0.202)	0.310 (0.226)
ROA		2.715 *** (0.346)	2.755 *** (0.347)	2.846 *** (0.459)	2.604 *** (0.510)
CASHFLOW		0.088 (0.356)	0.117 (0.357)	−0.296 (0.494)	0.812 (0.498)
LEV		0.490 *** (0.151)	0.448 *** (0.153)	0.676 *** (0.202)	0.257 (0.211)
Constant	29.787 *** (0.041)	−6.834 *** (0.511)	−6.829 *** (0.506)	−7.083 *** (0.706)	−7.582 *** (0.818)
Industry FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Observations	24,551	24,551	24,551	14,353	10,198
Adjusted R ²	0.965	0.978	0.978	0.976	0.980

Note: Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 3 Column (3) shows that the coefficient of ESG rating level (ESG_PER) is still significantly positive at the 1% statistical level, and the coefficient of the interaction term between ESG rating level and rating divergence (ESG_PER × ESG_DIS) is significantly negative at least at the 10% level (−0.331). This suggests that as ESG rating divergence increases, the effect of non-financial information revealed by ESG rating agencies on increasing the total factor productivity diminishes, and the inconsistency in ratings across agencies reduces investors' ability and willingness to use ESG rating information. Table 3 Columns (4) and (5) represent high ESG_DIS and low ESG_DIS subsamples to test the effect of ESG_PER on TFP. A value of ESG_DIS higher than the median indicates a small value; otherwise, it indicates a large value. Table 3 Columns (4) and (5) show that the coefficient of ESG rating level (ESG_PER) is still significantly positive at the 1% statistical level, 2.210 and 3.058, respectively. This confirms research Hypothesis 2.

4.3. Robustness Tests

4.3.1. An Alternative Measure of the Total Factor Productivity

Additionally, this study utilizes the Olley–Pakes method as model (6) [52] and Generalized Method of Moments [53] methods with GMM system to estimate TFP and perform robustness tests.

$$\begin{aligned} \ln Y_{i,t} = & \theta_0 + \theta_1 \ln L_{i,t} + \theta_2 \ln K_{i,t} + \theta_3 \ln Mat_{i,t} + \theta_4 Age_{i,t} \\ & + \theta_5 Export_{i,t} + \theta_6 SOE_{i,t} + \theta_7 Exit_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (6)$$

where L is measured by the number of employees. K is measured by the net value of fixed assets. Mat is intermediate inputs as a production factor. Age denotes the number of years since the company was listed. $Export$ is a dummy variable indicating whether the company engages in import and export activities. SOE is company ownership. $Exit$ is a dummy variable indicating whether the firm has withdrawn from the market. ε_{it} is the residual term.

Use model (4) and (5) for regression. The empirical results are shown in column (1) to (4) of Table 4. In both models where the total factor productivity is measured in different ways, the coefficient on the main effect ESG rating level (ESG_PER) is positively significant at the statistical level of at least 1%, implying that being rated higher leads to an increase in the company's total factor productivity, and that positive non-financial information unique to the company is provided to investors by ESG agencies. When the total factor productivity is calculated using the OP model and the GMM model, the coefficient of the interaction term between ESG rating level and ESG rating divergence ($ESG_PER \times ESG_DIS$) is significantly negative at least at the 10% level (-0.373 , -0.197).

Table 4. Robustness test results.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(5)	(6)
	Replacement Total Factor Productivity				ESG_PER		ESG Rating Divergence	
	OP		GMM		Repl. Std. Method		Repl. Absolute Dev.	
ESG_PER	3.019 *** (0.124)	3.128 *** (0.127)	1.868 *** (0.103)	1.880 *** (0.104)	3.069 *** (0.340)	3.104 *** (0.340)	2.363 *** (0.101)	2.501 *** (0.105)
ESG_DIS		−0.885 *** (0.156)		−0.113 (0.140)		−0.223 * (0.134)		−0.945 *** (0.184)
ESG_PER × ESG_DIS		−0.373 *** (0.058)		−0.197 * (0.181)		−0.398 *** (0.051)		−0.157 * (0.280)
Obser.	24,551	24,551	24,551	24,551	24,551	24,551	24,551	24,551
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Adjusted R ²	0.984	0.984	0.971	0.971	0.977	0.977	0.978	0.978

Note: Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

4.3.2. Replacing the Measurement Method of ESG Rating Performance

In order to make the rating information of different ESG rating agencies comparable, the ratings or scores of different agencies are first standardized. In addition to the mean of 0 and standardization of 1 for ESG ratings in the main regression in this paper, some of the literature also use a normalization method with a minimum value of 0 and a maximum value of 1 [22]. In the robustness test, the standardized method with a minimum value of 0 and a maximum value of 1 is used to calculate the rating performance, replacing the original indicators. The regression results are shown in columns (5) to (6) of Table 4, which are consistent with the main regression results. The coefficient of the main effect ESG rating level (ESG_PER) is positively significant at the 1% statistical level. The coefficient of the interaction term between rating level and rating divergence ($ESG_PER \times ESG_DIS$) is negative and significant at the 1% level.

4.3.3. Replacing the Measurement Method of ESG Divergence

In the robustness test, different measurement indicators are used for ESG rating divergence. We calculate the absolute deviation of ESG rating scores for the four types of ESG indicators. The regression results are shown in columns (7) to (8) of Table 4, which are consistent with the main regression results. The coefficient of the main effect ESG rating level (ESG_PER) is positively significant at the 1% statistical level. The coefficient of the interaction term between rating level and rating divergence ($ESG_PER \times ESG_DIS$) is negative and significant at the 10% level.

4.4. Endogeneity Test

To further mitigate the endogeneity problem, we adopted the two-stage least squares instrumental variable method. The endogeneity test results are demonstrated in Table 5. Following [54], the instrumental variable presents the average ESG rating of other companies in the same province during the same year (ESG_PER_PROV). From a regional perspective, first-tier municipalities including Beijing and Shanghai benefit from more comprehensive regulatory enforcement and mature ESG infrastructure. Inland provinces, however, exhibit deficiencies in ESG disclosure quality and third-party verification systems [42]. Companies mimic each other in terms of ESG performance and exhibit the peer effect of ESG information disclosure [55]. The same province and year mirror the same social and environment constraints, whereas the companies' SG performance is affected by other corporations. The underlying logic is that province annual ESG disclosure scores do not directly affect the total factor productivity, but are correlated with corporate ESG disclosure. The higher the average score of ESG disclosure in the province where the company is located in that year, the more likely the company is to disclose ESG information under the guidance of the province environment. The estimated results are reported in columns (1) to (2) of Table 5. The results are consistent with the benchmark regression.

Table 5. Endogeneity test result.

Variable	IV = ESG_PER_PROV	
	ESG_PER	TFP
ESG_PER		0.0257 ** (0.340)
ESG_PER_PROV	0.0365 ** (0.017)	
Controls	YES	YES
Industry FE	YES	YES
Year FE	YES	YES
Observations	24,566	24,566
Adjusted R ²	0.908	0.048
Mean	0.221	30.267
Kleibergen–Paap rk LM		11.4
Chi-sq(1) P-val		0.000

Note: Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

4.5. Mechanism Analysis

In the preceding analysis, we find that ESG rating divergence inhibits the positive impact of ESG ratings on corporate productivity. Based on our hypothesis development, we propose that ESG rating divergence may exacerbate external information asymmetry. This leads to increased risk perception among external investors/creditors, who then demand higher risk premiums, resulting in higher corporate financing costs and narrower financing channels, thereby suppressing productivity. Meanwhile, ESG rating divergence creates uncertainty for management regarding the long-term return certainty of ESG investments. Under the pressure of short-term performance evaluations, management prioritizes allocating resources to short-term profit-generating projects, thereby undermining the potential for productivity improvement. Therefore, we infer that financing constraints and managerial short-termism may be channels of influence between ESG rating divergence and corporate productivity.

4.5.1. The Effect of Financial Constraints

ESG rating divergence indicate that different ESG rating agencies provide conflicting signals in the market and increase the high uncertainty and complexity [53], which affect

the perception and response strategies of companies and stakeholders toward the credibility of ESG ratings [11,56]. Constrained by information asymmetry, the divergence of ESG ratings can damage the quality and consistency of information available to investors; investors may feel anxious, nervous, or panic at the unstable emotions [12] which can affect their own investment behavior decisions [36] or have a significant adverse effect on their preferences [57]. For example, when there is a significant divergence in ESG ratings among companies, investors may mitigate their own risks by reducing investments in the company and increasing financing costs [11,12,22,24,58]. As investors' investments decrease and the required risk premium increases [22,59], the degree of financing constraints for companies has increased accordingly [36]. The impact of financing constraints on investment decisions, resource allocation, and the adoption of new technologies are key drivers of corporate productivity [60,61]. Companies facing financial constraints have a negative impact on their overall value and productivity [62]. Fiscal constraints may force companies to postpone or cancel investments in new technologies, hindering their ability to improve production processes and decrease total factor productivity [63].

Therefore, we examined the effect of financial constraints underlying the effect of ESG divergence on TFP. We construct the following regression model:

$$SA_{i,t} = \gamma_0 + \gamma_1 ESG_DIS_{i,t-1} + Controls_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (7)$$

$$\begin{aligned} TFP_{i,t} = & \delta_0 + \delta_1 ESG_PER_{i,t-1} + \delta_2 ESG_DIS_{i,t-1} \\ & + \delta_3 ESG_PER_{i,t-1} \times ESG_DIS_{i,t-1} \\ & + \delta_4 SA_{i,t} + Controls_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \end{aligned} \quad (8)$$

SA is the company's financing constraints, measured using the absolute value of the SA index as a substitute variable for corporate financing constraints [64]. The SA index is negative, and the larger absolute value, the greater the financing constraints faced by the company. The SA index reflects the financing constraints based on the company's size and age, calculated as follows:

$$SA = -0.737Size + 0.043Size^2 - 0.040Age \quad (9)$$

Size is the natural logarithm of the company's total assets, and Age is the number of years the company has been in operation. A smaller SA index value indicates more severe financing constraints.

4.5.2. The Effect of Management Short-Termism

Additionally, as important strategic decision-makers in companies, management plays a leading role in the implementation of ESG strategic activities [65]. When discrepancies arise in corporate ESG ratings, these divergences can also influence managers' perceptions of the credibility of ESG scores and their corresponding response strategies [11,56]. ESG rating divergences can reduce information transparency and worsen the corporate information environment [56,57]. ESG rating divergence creates a "masking effect", making it difficult for shareholders and other stakeholders at an informational disadvantage to fully grasp information on corporate environmental protection, social responsibility performance, and corporate governance. This weakens their oversight of management, leading to significant divergence between management's decision-making and shareholder interests, which exacerbate the company's agency costs [56]. The increase in agency costs provides more convenient conditions for managers to choose short-termism behaviors such as "greenwashing" strategies, reducing R&D expenses, and manipulating earnings [24,56]. Compared to developing countries' capital markets, China's capital markets are less mature, where information asymmetry exerts stronger distorting effects on companies [66],

potentially leading to higher agency costs. Consequently, ESG rating divergence may incentivize management to engage in more short-termism behaviors.

Moreover, ESG rating divergence has led to excessive negative media coverage of the company and has triggered excessive negative media coverage of companies, increasing reputational risks associated with short-termism management behavior. As the conduit for information exchange between capital markets and corporations, media scrutiny of ESG rating divergences rapidly signals negative perceptions to external stakeholders. This heightened attention significantly increases the likelihood of companies with divergent ESG ratings being exposed. Under reputation mechanism theory, an increase in negative media coverage may increase a company's reputation risk. Once a company's reputation is damaged, its management—as part of the reputational community—also suffers substantial reputational loss. Management may be unwilling to bear this reputational cost, creating strong short-termism incentives to boost short-term performance quickly. This allows them to gain investor approval and mitigate the reputational risks caused by ESG rating discrepancies. In summary, ESG rating divergences may increase agency costs, cause instability in investor sentiment, and increase management reputation risks. In this situation, management will have a strong short-termism motivation to maintain high short-term performance of the company, alleviate the negative impact of the divergence, and thereby reduce the ability of corporate productivity.

Consequently, we also examined the role of managerial short-termism in the impact of ESG rating divergences on total factor productivity. We construct the following regression model:

$$Myopia_{i,t} = \eta_0 + \eta_1 ESG_DIS_{i,t-1} + Controls_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (10)$$

$$\begin{aligned} TFP_{i,t} = & \theta_0 + \theta_1 ESG_PER_{i,t-1} + \theta_2 ESG_DIS_{i,t-1} \\ & + \theta_3 ESG_PER_{i,t-1} \times ESG_DIS_{i,t-1} + \theta_4 Myopia_{i,t} \\ & + Controls_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \end{aligned} \quad (11)$$

The existing literature indicates that insufficient R&D investment is the main manifestation of managerial short-termism [67]. Management perceives substantial R&D expenditures as a net outflow that directly reduces current-year earnings. This significantly impacts short-term corporate value, attracts investor attention, and exerts downward pressure on stock prices [68]. Furthermore, the intangible, complex, ambiguous, and long-term nature of R&D activities increases the difficulty for external investors to detect internal misconduct, thereby strengthening management's incentive for short-termism [68]. Therefore, following the approach of the existing studies such as [67,68], this study uses a dummy variable to indicate whether R&D expenditure cuts occurred as a measure of managerial short-termism (Myopia). If Myopia value is less than 0, Myopia is set to 1; otherwise, it is set to 0. The calculation formula for R&D expenditure cuts is as follows:

$$R\&D\ exp\ enditure_cuts = \left[\frac{R\&D\ exp\ enditure_t - R\&D\ exp\ enditure_{t-1}}{Assets_Beginning_t} \right] \times 100 \quad (12)$$

In Table 6, from column (1), the interaction term $SA \times ESG_DIS$ is significantly negative at the 10% level, indicating that the exacerbation of financial constraints caused by ESG rating divergence have a negative impact on corporate productivity. Column (2) shows that the interaction term $Myopia \times ESG_DIS$ is significantly negative at the 10% level, indicating that the opportunistic risk caused by ESG rating divergence exacerbates management short-termism and thus has a negative impact on corporate productivity.

Table 6. Mechanism test results.

Variable	(1) TFP	(2) TFP
ESG_PER	1.976 *** (0.098)	2.034 *** (0.101)
ESG_DIS	−0.272 ** (0.132)	−0.438 *** (0.132)
ESG_PER × ESG_DIS	−0.040 * (0.201)	−0.045 * (0.205)
SA	−0.107 * (0.093)	
SA × ESG_DIS	−0.411 * (0.430)	
Myopia		−0.158 *** (0.044)
Myopia × ESG_DIS		−0.059 * (0.209)
SIZE	2.477 *** (0.038)	2.564 *** (0.037)
GROWTH	0.393 *** (0.049)	0.394 *** (0.055)
TURN	0.248 *** (0.014)	0.252 *** (0.015)
FP	0.425 *** (0.153)	0.424 *** (0.156)
ROA	2.949 *** (0.342)	3.110 *** (0.347)
CASHFLOW	0.309 (0.352)	0.190 (0.362)
LEV	0.514 *** (0.152)	0.482 *** (0.155)
Constant	−6.263 *** (0.526)	−7.420 *** (0.515)
Industry FE	YES	YES
Year FE	YES	YES
Observations	24,392	22,999
Adjusted R ²	0.978	0.978

Note: Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

4.6. Heterogeneity Test

4.6.1. Information Environment

As verified in the mechanism test, divergences in ESG ratings increase financing constraints and managerial short-termism, further affecting corporate productivity. Due to the high correlation between corporate information disclosure and the information environment, stakeholders or management may face interference when encountering ESG rating divergences in different information environments. Therefore, we conducted a series of heterogeneity tests based on the information environment.

First, we will explore one of the most important determinants of the company's information environment, that is, the impact of the company's size [69,70]. Information disclosure involves a large number of fixed costs. For large companies, the cost of disclosing various financial and non-financial information is relatively low. In addition, large companies are subject to closer public supervision, and the pressure to improve the information environment is also greater. Based on the dual consideration of cost and pressure, large companies prefer to improve the information environment through voluntary disclosure, analyst disclosure, and media coverage. The number of analyst followers and the number

of media reports are also commonly used indicators of a company's information environment. The more analyst followers and media coverage, the more external stakeholders know about the company and the more transparent the information is.

According to the company's overall information environment indicators, the sample is divided into two groups: the poor information environment group (small size, low analyst tracking, low media coverage) and the good information environment group (large size, high analyst tracking, high media coverage). The values of scale, analyst tracking, and media reports and information disclosure quality higher than the annual median is small; otherwise, it is large. Tables 7 and 8 show the group regression results of ESG ratings and total factor productivity. The coefficient on ESG_PER is more significant in the group of large, highly analyst-followed, and multimedia-reported companies, and the difference in the coefficients between the groups is significant at least at the 1% level, which is also true when accounting for the effect of divergence in ESG ratings. Overall, the non-financial information has a significant effect on TFP only for companies with a better financial information environment.

Table 7. Compliance with different information environment groups and the effects of ESG rating.

Variable	(1) Small	(2) Size Large	(3) Analyst Tracker Low	(4) Analyst Tracker High	(5) Media Coverage Low	(6) Media Coverage High
	PEG					
ESG_PER	0.364 (0.227)	1.684 *** (0.117)	0.217 *** (0.015)	2.116 *** (0.143)	1.710 *** (0.182)	2.498 *** (0.125)
SIZE	1.815 *** (0.093)	2.577 *** (0.054)	0.248 *** (0.005)	2.547 *** (0.053)	2.423 *** (0.064)	2.610 *** (0.046)
GROWTH	0.390 *** (0.062)	0.458 *** (0.063)	0.035 *** (0.006)	0.492 *** (0.082)	0.421 *** (0.072)	0.401 *** (0.065)
TURN	0.004 (0.012)	0.219 *** (0.022)	0.020 *** (0.002)	0.268 *** (0.030)	0.151 *** (0.020)	0.362 *** (0.020)
FP	−0.169 (0.201)	0.578 *** (0.205)	0.031 (0.019)	0.306 (0.214)	0.079 (0.213)	0.701 *** (0.193)
ROA	3.020 *** (0.347)	4.325 *** (0.572)	0.239 *** (0.038)	5.593 *** (0.754)	3.205 *** (0.490)	3.088 *** (0.459)
CASHFLOW	0.913 ** (0.419)	−0.101 (0.483)	0.030 (0.045)	−0.891 (0.570)	0.175 (0.522)	0.031 (0.466)
LEV	1.840 *** (0.170)	0.451 ** (0.223)	0.076 *** (0.017)	0.272 (0.249)	1.137 *** (0.198)	0.177 (0.205)
Constant	2.066 * (1.3)	−7.096 *** (0.783)	−0.654 *** (0.073)	−6.570 *** (0.727)	−5.206 *** (0.899)	−8.523 *** (0.661)
Coe. Diff.	(1) vs. (2)		(3) vs. (4)		(5) vs. (6)	
Inspection	0.000		0.000		0.000	
<i>p</i> -value						
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	11,475	13,005	16,559	7992	11,886	12,664
Adjusted R ²	0.983	0.982	0.977	0.982	0.979	0.979

Note: Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 8. Compliance with different information environment groups and the effects of ESG rating divergence.

Variable	(1) Small	(2) Size Large	(3) Analyst Tracker Low	(4) Tracker High PEG	(5) Media Coverage Low	(6) Coverage High
ESG_PER	0.301 (0.227)	1.688 *** (0.121)	0.219 *** (0.015)	2.160 *** (0.147)	1.706 *** (0.183)	2.548 *** (0.129)
ESG_DIS	−0.172 (0.151)	−0.455 ** (0.178)	−0.024 (0.016)	−0.753 *** (0.204)	−0.070 (0.183)	−0.556 *** (0.174)
ESG_PER × ESG_DIS	−0.821 *** (0.164)	−1.088 *** (0.297)	−0.094 *** (0.022)	−1.436 *** (0.411)	−1.104 *** (0.249)	−0.645 ** (0.306)
SIZE	1.823 *** (0.093)	2.598 *** (0.055)	0.247 *** (0.005)	2.576 *** (0.055)	2.423 *** (0.063)	2.627 *** (0.047)
GROWTH	0.401 *** (0.063)	0.455 *** (0.063)	0.036 *** (0.006)	0.494 *** (0.082)	0.432 *** (0.073)	0.393 *** (0.066)
TURN	−0.003 (0.012)	0.220 *** (0.022)	0.019 *** (0.002)	0.265 *** (0.031)	0.144 *** (0.020)	0.363 *** (0.020)
FP	−0.185 (0.202)	0.582 *** (0.204)	0.031 (0.019)	0.320 (0.214)	0.076 (0.214)	0.719 *** (0.193)
ROA	3.024 *** (0.347)	4.421 *** (0.573)	0.241 *** (0.038)	5.725 *** (0.755)	3.220 *** (0.491)	3.146 *** (0.459)
CASHFLOW	0.877 ** (0.419)	−0.064 (0.483)	0.029 (0.045)	−0.841 (0.571)	0.133 (0.523)	0.085 (0.468)
LEV	1.868 *** (0.171)	0.401 * (0.225)	0.075 *** (0.018)	0.220 (0.249)	1.136 *** (0.199)	0.120 (0.207)
Constant	2.035 * (1.304)	−7.005 *** (0.789)	−0.597 *** (0.072)	−6.501 *** (0.735)	−4.804 *** (0.887)	−8.158 *** (0.658)
Coe. Diff. Inspection p-value	(1) vs. (2) 0.000		(3) vs. (4) 0.000		(5) vs. (6) 0.000	
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	11,475	13,005	16,559	7992	11,886	12,664
Adjusted R ²	0.983	0.982	0.977	0.982	0.979	0.979

Note: Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

4.6.2. ESG Information Disclosure Quality

Previous studies have shown that the quality of ESG information has a significant positive impact on company value [71] and stock market performance [72]. Regarding information disclosure and ESG practices [73–75]. Although [76] indicated that ESG performance quality exerts no influence on a company's market value, the dominant perspective is that more comprehensive and higher-quality corporate disclosures enable rating agencies to obtain more consistent information [20], thereby mitigating rating divergences [36]. Disclosure–action mismatch constitutes a negative signal, reflecting inadequate corporate governance quality and insufficient commitment to addressing the environmental impacts of business operations [77]. Therefore, increasing the quality of ESG information disclosure can mitigate information asymmetry and ensure sustainability not only in words but also in practical actions. We further explored whether the relationship between ESG rating agencies and corporate productivity changes with variations in the quality of ESG-related report disclosures and the mechanism of their interaction.

To ensure the independence of variables from ESG performance, variables only reflect disclosure behavior, rather than corresponding to the ESG performance of indicators. Variables are used to reflect the quality of companies' ESG-related reports: (1) whether the company voluntarily discloses ESG-related reports; (2) whether an independent environ-

mental report is provided; (3) whether to comply with the GRI standards for sustainable development reporting; (4) the gender of board secretaries, as female participation positively affects the ESG performance and ESG information disclosure [78,79] and thus promotes the quality of ESG information disclosure. Based on the above variables, group tests were conducted using the same models (1)–(2) in which we re-estimate the models using only E (Environmental) and S (Social) indicators excluding G (governance) indicators as “governance” directly affects disclosure quality.

The results of (1) and (2) in Tables 9–12 indicate that compared to companies that voluntarily disclose, mandatory disclosure have a more significant impact on total factor productivity in terms of ESG ratings (E, S) and ESG rating differences (E, S). This is mainly due to heavy industries in China being required to conduct mandatory ESG reporting, they are subject to more intense social pressure, and external regulatory constraints exert a positive influence on promoting transparency. The sample is divided into groups based on compliance with GRI standards and with independent environmental reports. Tables 9–12, columns (3)–(6), report the results. In the “non-compliance with GRI” and “without independent environmental reports” groups, a significant correlation is observed, while columns (4) and (6) do not reflect such relation. We observe that companies complying with the GRI disclosure framework and independent environmental reports enjoy a better information environment, helping mitigate the negative impacts of ESG rating divergences. The results are shown in Tables 9–12, columns (7)–(8); the correlation between ESG rating, ESG rating divergence, and TFP is only significant in the “male board secretaries” group, which indicates that companies with female board secretaries have better ESG information.

Table 9. Compliance with ESG information disclosure quality group and the effects of ESG rating (E).

Variable	(1) Voluntary Disclosure	(2) Compulsory Disclosure	(3) Non Envir. Rpts	(4) Auth. Envir. Rpts	(5) Non- with GRI	(6) Compli. with GRI	(7) Female Board Sec	(8) Male Board Sec
ESG_PER	0.117 * (0.062)	1.335 *** (0.345)	0.278 ** (0.109)	0.110 (0.344)	0.350 *** (0.115)	0.085 (0.098)	0.156 (0.191)	0.213 * (0.127)
SIZE	1.540 *** (0.031)	2.531 *** (0.043)	2.475 *** (0.037)	2.236 *** (0.120)	2.542 *** (0.037)	1.480 *** (0.068)	2.418 *** (0.068)	2.455 *** (0.044)
GROWTH	0.211 *** (0.020)	0.956 *** (0.111)	0.396 *** (0.052)	0.169 (0.165)	0.405 *** (0.055)	0.011 (0.052)	0.326 *** (0.075)	0.434 (0.067)
TURN	−0.007 (0.007)	0.570 *** (0.037)	0.221 *** (0.014)	0.264 *** (0.061)	0.230 *** (0.015)	0.051 ** (0.024)	0.240 *** (0.024)	0.250 *** (0.017)
FP	0.121 (0.078)	0.846 *** (0.280)	0.313 ** (0.154)	0.704 (0.450)	0.460 *** (0.161)	0.504 *** (0.160)	0.365 (0.274)	0.441 ** (0.175)
ROA	1.972 *** (0.150)	6.114 *** (0.876)	2.943 *** (0.342)	4.878 *** (1.757)	2.991 *** (0.354)	3.311 *** (0.516)	3.515 *** (0.533)	2.958 *** (0.429)
CASHFLOW	0.797 *** (0.132)	−0.408 (0.852)	0.330 (0.362)	0.734 (1.242)	0.304 (0.379)	0.831 ** (0.337)	0.707 (0.643)	0.341 (0.418)
LEV	0.924 *** (0.077)	1.861 *** (0.273)	0.759 *** (0.149)	1.064 ** (0.516)	0.815 *** (0.153)	0.939 *** (0.193)	0.868 *** (0.254)	0.651 *** (0.174)
Constant	5.757 *** (0.296)	10.590 *** (0.834)	−5.491 *** (0.521)	−2.812 *** (1.685)	−6.947 *** (0.532)	6.426 *** (0.742)	−5.684 *** (0.979)	−5.868 *** (0.610)
Coeff. diff. test p-value	(1) vs. (2) 0.000		(3) vs. (4) 0.000		(5) vs. (6) 0.000		(5) vs. (6) 0.000	
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	13,765	10,780	23,340	1204	22,494	2047	7351	16,761
Adjusted R ²	0.706	0.969	0.977	0.985	0.977	0.991	0.979	0.977

Note: Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 10. Compliance with ESG information disclosure quality group and the effects of ESG rating (E) divergence.

Variable	(1) Voluntary Disclosure	(2) Compulsory Disclosure	(3) Non Envir. Rpts	(4) Auth. Envir. Rpts	(5) Non- with GRI	(6) Compli. with GRI	(7) Female Board Sec	(8) Male Board Sec
ESG_PER	0.120 * (0.063)	1.645 *** (0.470)	0.087 *** (0.023)	0.041 (0.092)	0.067 *** (0.025)	0.022 (0.030)	0.040 (0.042)	0.108 *** (0.028)
ESG_DIS	−0.005 (0.012)	−0.078 * (0.045)	−0.117 (0.130)	−0.011 (0.472)	−0.105 (0.140)	−0.015 (0.109)	−0.009 (0.223)	−0.064 (0.153)
ESG_PER × ESG_DIS	−0.048 (0.076)	−0.536 (0.396)	−0.433 *** (0.160)	−0.255 (0.539)	−0.605 *** (0.175)	−0.301 ** (0.151)	−0.371 (0.292)	−0.416 ** (0.185)
SIZE	1.538 *** (0.032)	2.530 *** (0.045)	2.478 *** (0.038)	2.247 *** (0.121)	2.539 *** (0.037)	1.491 *** (0.069)	2.415 *** (0.070)	2.458 *** (0.045)
GROWTH	0.210 *** (0.020)	0.963 *** (0.111)	0.405 *** (0.052)	0.161 (0.165)	0.415 *** (0.055)	0.014 (0.052)	0.333 *** (0.076)	0.441 *** (0.067)
TURN	−0.007 (0.007)	0.557 *** (0.037)	0.213 *** (0.014)	0.264 *** (0.061)	0.222 *** (0.015)	0.052 ** (0.024)	0.234 *** (0.024)	0.240 *** (0.017)
FP	0.121 (0.078)	0.848 *** (0.280)	0.335 ** (0.154)	0.728 (0.453)	0.480 *** (0.161)	0.489 *** (0.159)	0.380 (0.274)	0.471 *** (0.175)
ROA	1.973 *** (0.150)	6.152 *** (0.875)	2.989 *** (0.341)	4.877 *** (1.767)	3.042 *** (0.352)	3.276 *** (0.519)	3.537 *** (0.533)	3.034 *** (0.427)
CASHFLOW	0.794 *** (0.132)	−0.455 (0.852)	0.314 (0.362)	0.729 (1.250)	0.275 (0.379)	0.868 ** (0.342)	0.704 (0.644)	0.313 (0.418)
LEV	0.926 *** (0.077)	1.888 *** (0.273)	0.801 *** (0.149)	1.057 ** (0.514)	0.861 *** (0.153)	0.920 *** (0.193)	0.894 *** (0.255)	0.705 *** (0.175)
Constant	5.787 *** (0.302)	−10.435 *** (0.880)	−5.829 *** (0.531)	−2.980 * (1.713)	−6.908 *** (0.540)	6.321 *** (0.750)	−5.645 *** (1.002)	−5.944 *** (0.622)
Coeff. diff. test <i>p</i> -value	(1) vs. (2) 0.000		(3) vs. (4) 0.000		(5) vs. (6) 0.000		(5) vs. (6) 0.000	
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	13,765	10,780	23,340	1204	22,494	2047	7351	16,761
Adjusted R ²	0.706	0.969	0.977	0.985	0.977	0.991	0.979	0.977

Note: Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 11. Compliance with ESG information disclosure quality group and the effects of ESG rating (S).

Variable	(1) Voluntary Disclosure	(2) Compulsory Disclosure	(3) Non Envir. Rpts	(4) Auth. Envir. Rpts	(5) Non- with GRI	(6) Compli. with GRI	(7) Female Board Sec	(8) Male Board Sec
ESG_PER	0.162 ** (0.069)	1.863 *** (0.322)	0.044 (0.140)	0.192 (0.409)	0.080 (0.148)	0.196 (0.129)	0.418 (0.259)	0.007 (0.156)
SIZE	1.534 *** (0.032)	2.494 *** (0.044)	2.461 *** (0.038)	2.234 *** (0.120)	2.522 *** (0.038)	1.475 *** (0.068)	2.385 *** (0.070)	2.445 *** (0.045)
GROWTH	0.210 *** (0.020)	0.956 *** (0.111)	0.396 ** (0.052)	0.175 (0.166)	0.404 *** (0.055)	0.010 (0.052)	0.329 *** (0.075)	0.433 (0.067)
TURN	−0.007 (0.007)	0.567 *** (0.037)	0.223 *** (0.014)	0.265 *** (0.061)	0.233 *** (0.015)	0.050 ** (0.024)	0.245 *** (0.024)	0.252 ** (0.017)
FP	0.118 (0.078)	0.840 *** (0.281)	0.310 ** (0.154)	0.698 (0.451)	0.456 *** (0.161)	0.496 *** (0.160)	0.369 (0.274)	0.439 ** (0.175)
ROA	1.972 *** (0.150)	6.216 *** (0.876)	2.917 *** (0.342)	4.900 *** (1.759)	2.961 *** (0.354)	3.316 *** (0.516)	3.483 *** (0.535)	2.941 *** (0.429)
CASHFLOW	0.794 *** (0.132)	−0.487 (0.850)	0.295 (0.362)	0.733 (1.244)	0.253 (0.379)	0.813 ** (0.336)	0.642 (0.642)	0.316 (0.418)
LEV	0.925 *** (0.077)	1.871 *** (0.273)	0.745 *** (0.149)	1.051 ** (0.517)	0.795 *** (0.152)	0.938 *** (0.193)	0.853 *** (0.254)	0.641 *** (0.174)
Constant	5.811 *** (0.303)	−9.892 *** (0.852)	−5.557 *** (0.531)	−2.795 *** (1.685)	−6.683 *** (0.543)	6.465 *** (0.740)	−5.243 *** (1.001)	−5.745 *** (0.621)
Coeff. diff. test p-value	(1) vs. (2) 0.000				(3) vs. (4) 0.000			
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	13,765	10,780	23,340	1204	22,494	2047	7351	16,761
Adjusted R ²	0.706	0.969	0.977	0.985	0.977	0.991	0.979	0.977

Note: Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 12. Compliance with ESG information disclosure quality group and the effects of ESG rating (S) divergence.

Variable	(1) Voluntary Disclosure	(2) Compulsory Disclosure	(3) Non Envir. Rpts	(4) Auth. Envir. Rpts	(5) Non- with GRI	(6) Compli. with GRI	(7) Female Board Sec	(8) Male Board Sec
ESG_PER	0.153 ** (0.074)	1.793 *** (0.326)	0.142 *** (0.026)	0.066 (0.416)	0.025 (0.153)	0.159 (0.153)	0.334 (0.263)	0.173 *** (0.030)
ESG_DIS	−0.017 (0.011)	−0.316 * (0.059)	−0.028 * (0.145)	−0.251 ** (0.098)	−0.130 *** (0.027)	−0.087 *** (0.032)	−0.109 * (0.045)	−0.067 (0.161)
ESG_PER × ESG_DIS	−0.032 (0.078)	−0.646 * (0.463)	−0.470 *** (0.179)	−0.391 (0.595)	−0.394 * (0.204)	−0.021 (0.153)	−0.568 * (0.323)	−0.454 ** (0.206)
SIZE	1.537 *** (0.033)	2.527 *** (0.045)	2.477 *** (0.039)	2.293 *** (0.125)	2.536 *** (0.038)	1.511 *** (0.071)	2.400 *** (0.070)	2.466 *** (0.046)
GROWTH	0.210 *** (0.020)	0.935 (0.111)	0.390 *** (0.052)	0.159 (0.170)	0.399 *** (0.055)	0.014 (0.052)	0.326 *** (0.075)	0.423 *** (0.067)
TURN	−0.006 (0.007)	0.564 *** (0.037)	0.225 *** (0.014)	0.269 *** (0.061)	0.236 *** (0.015)	0.052 ** (0.023)	0.245 *** (0.024)	0.254 *** (0.017)
FP	0.120 (0.078)	0.815 *** (0.282)	0.320 ** (0.154)	0.698 (0.448)	0.466 *** (0.161)	0.483 *** (0.159)	0.369 (0.275)	0.457 *** (0.176)
ROA	1.963 *** (0.150)	6.061 *** (0.877)	2.851 *** (0.341)	4.936 *** (1.746)	2.896 *** (0.353)	3.293 *** (0.518)	3.448 *** (0.553)	2.860 *** (0.429)
CASHFLOW	0.795 *** (0.132)	−0.482 (0.850)	0.315 (0.362)	0.741 (1.236)	0.268 (0.379)	0.808 ** (0.337)	0.628 (0.642)	0.352 (0.419)
LEV	0.923 *** (0.076)	1.823 *** (0.273)	0.734 *** (0.149)	0.897 * (0.520)	0.784 *** (0.152)	0.875 *** (0.195)	0.829 *** (0.254)	0.633 *** (0.174)
Constant	5.796 *** (0.308)	−10.384 *** (0.883)	−5.883 *** (0.543)	−3.557 *** (1.750)	−6.881 *** (0.554)	6.126 *** (0.769)	−5.413 *** (1.014)	−6.055 *** (0.638)
Coeff. diff. test <i>p</i> -value	(1) vs. (2) 0.000				(3) vs. (4) 0.000			
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	13,765	10,780	23,340	1204	22,494	2047	7351	16,761
Adjusted R ²	0.707	0.969	0.977	0.985	0.977	0.991	0.979	0.977

Note: Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

5. Conclusions

As an emerging market, China's ESG rating divergence is more severe compared to developed countries, but research on ESG rating divergence is still in its infancy. In this context, this paper takes Chinese A-share-listed companies from 2016 to 2023 as data samples to explore the impact and mechanism of ESG ratings and ESG rating divergence on corporate productivity. The research findings are as follows: (1) Although higher ESG ratings are positively correlated with corporate productivity, significant differences in ratings can weaken this effect. (2) Mechanism tests indicated that ESG rating divergence mainly weakens corporate productivity by exacerbating financing constraints and management's short-termism. (3) Heterogeneity tests found that in companies with a good information environment but low-quality ESG-related reports, the impact of ESG ratings and their divergence is more significant. Companies complying with the GRI disclosure framework and independent environmental reports enjoy a better information environment, helping mitigate the negative impacts of ESG rating divergences.

Based on the study findings and conclusions above, this paper proposes the following policy recommendations from the perspectives of government and companies: First, the government should further improve the institutional framework for ESG rating agencies and ESG disclosure standards, developing a domestic ESG system aligned with China's context and international market developments, thereby enhancing the comparability of ESG ratings and their positive role as investment references while minimizing negative impacts. This releases the benefits of corporate ESG practices and effectively leverages the governance role of ESG ratings for companies and their management. Second, companies should be focusing on higher-quality and more transparent ESG disclosure to reduce the adverse effects of ESG rating divergence. Particular attention should be paid to differences in corporate information environments, internal supervision system, and financing constraints. This approach will better leverage the positive effects of ESG ratings, reduce stakeholders' information supervision costs, and contribute to achieving long-term corporate value and sustainable development.

This study has several limitations as follows: First, the research context is confined to China; future research should expand to companies across different countries to fully capture ESG impacts under diverse economic contexts. Second, while this paper examines the ESG-TFP linkage, with a focus on financing constraints and managerial short-termism as mechanisms, additional pathways merit exploration for a comprehensive understanding of ESG's effect on productivity. Lastly, empirical results may be influenced by the COVID-19 pandemic (more notably in 2020 and moderately in 2021).

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