

# ***ESG Rating Divergence and Analysts' Earnings Forecast Divergence -- Analysis Based on Information Asymmetry***

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**Abstract:** ESG, as a novel non-financial indicator, has emerged as a pivotal focus in global capital markets. Nevertheless, challenges stemming from ESG rating divergence are increasingly significant. Utilizing data from A-share companies from (2009–2023), this study investigates how ESG rating divergence influences analysts' earnings forecast divergence. Results indicate that ESG rating divergence markedly intensifies analysts' earnings forecast divergence, with information asymmetry acting as a mediating factor to amplify this effect. However, the increase in corporate information transparency and the deepening of digital transformation can effectively weaken the negative effect. Heterogeneity analysis reveals stronger effects in low-competition industries, heavily polluting firms, and cost leadership enterprises. The study extends the ESG rating divergence impact to analysts' behavior, emphasizing the importance of corporate information transparency construction and digital transformation to optimize the ESG rating system. The findings enrich the literature on the factors influencing analysts' earnings forecast divergence and provide a theoretical basis for differentiated ESG regulation.

**Keywords:** ESG rating divergence, analysts' earnings forecast divergence, information asymmetry, information transparency, digital transformation

## **1. Introduction**

With the deepening of the “dual-carbon” goal and the concept of sustainable practice, corporate ESG performance has evolved beyond corporate social responsibility to a critical metric for long-term risk and value assessment [1]. China’s 2022 Guidelines on Investor Relations Management, mandate ESG integration into investor communications and encourage rating disclosures [2]. It can be seen that ESG has risen to a core concern in China and even the global capital market. However, there are still significant differences in the ESG ratings of the same company among different institutions. This paper identifies two primary causes: On the one hand, differences in assessment frameworks caused by the different allocation of weights to E, S and G. On the other hand, the disclosure standard is vague. Some companies selectively disclose ESG information, and this strategic disclosure forces rating agencies to rely on third-party data complements, which amplifies assessment bias [3]. According to the 2023 World Bank Group report, the average correlation of the top 10 global ESG rating agencies is only 0.43 [4]. This divergence not only weakens the decision-making usefulness of ESG information, but also may interfere with the logical judgment of the capital market. Therefore,

examining how ESG rating divergence influence user behavior and judgment has profound research implications.

Meanwhile, securities analysts, as an important information hub in the capital market, have a profound impact on investor expectations and asset pricing with the accuracy of their earnings forecasts. Currently, more and more analysts are focusing on firms' ESG ratings. Theoretically, the inconsistency of ESG ratings themselves may exacerbate the ambiguity of the information environment [5], forcing analysts to incorporate more subjective factors and ultimately expanding the degree of earnings forecast divergence.

This study leverages A-share data (2009-2023) to examine ESG rating divergence's effect on analysts' earnings forecast behavior. Its contributions are twofold: Firstly, the article extends the research scope of ESG rating divergence to analysts level, providing new evidence for understanding the heterogeneity of ESG information. Secondly, through the mechanism analysis and construction of a transmission chain, deepening user cognition while providing a foundation for regulators to implement differentiated ESG disclosure policies.

## 2. Theoretical Analysis and Research Hypotheses

### 2.1. ESG rating divergence and analysts' earnings forecast divergence

Based on signaling theory, ESG ratings, as an important signal of non-financial performance, can reduce the information asymmetry between investors and corporate management [1]. However, when there are significant ESG rating divergences, its "noise effect" may mask information value. According to the information uncertainty hypothesis, ESG rating divergence will cause analysts to question the reliability of the data [5], forcing analysts to adjust the forecast model, ultimately resulting in the increased earnings forecast dispersion [6]. Based on this, this article proposes:

**Hypothesis 1.** ESG rating divergence can exacerbate analysts' earnings forecast divergence.

### 2.2. ESG Rating Divergence, Information Asymmetry and Analysts' Earnings Forecast Divergence

The theory of information intermediation suggests that ambiguity of key non-financial indicators can force analysts to rely on private information channels for additional data [7]. It is further found that when ESG rating divergence exists, companies are more inclined to adopt the strategy of "disclosure packaging", and this selective disclosure behavior will further deteriorate the information environment and form double information barriers [8]. The intensification of information asymmetry will significantly increase the frequency and dispersion of earnings forecast revisions [9, 10], which ultimately leads to the intensification of earnings forecast divergence. Based on this, this article proposes:

**Hypothesis 2.** ESG rating divergence exacerbates information asymmetry and further amplifies analysts' earnings forecast divergence.

### 2.3. The Moderating Effect of Information Transparency and Enterprise Digital Transformation

From the perspective of information transparency, highly transparent enterprises not only reduce the ambiguity of ESG data through standardized disclosure, but also introduce third-party certification to improve the quality of disclosure [11], which also provides analysts with the possibility of "data penetration" [12]. Their trustworthy data ultimately significantly mitigates analysts' earnings forecast divergences. From the perspective of digital transformation, empirical studies show that digital transformation shortens the corporate ESG information delivery cycle by 15 days on average [13],

which means that analysts can obtain consistent underlying data earlier and reduce forecast bias due to outdated information. At the same time, relying on the "data penetration" function to achieve traceability of indicator level differences can compress subjective interpretation space [14], further weakening the interference effect of ratings divergence. Based on this, this article proposes:

**Hypothesis 3a.** Information transparency plays a negative moderating role between ESG rating divergence and analysts' earnings forecast divergence.

**Hypothesis 3b.** Corporate digital transformation plays a negative moderating role between ESG rating divergence and analysts' earnings forecast divergence.

Based on the above analysis, the article constructs a theoretical model diagram, as shown in Figure 1 below.

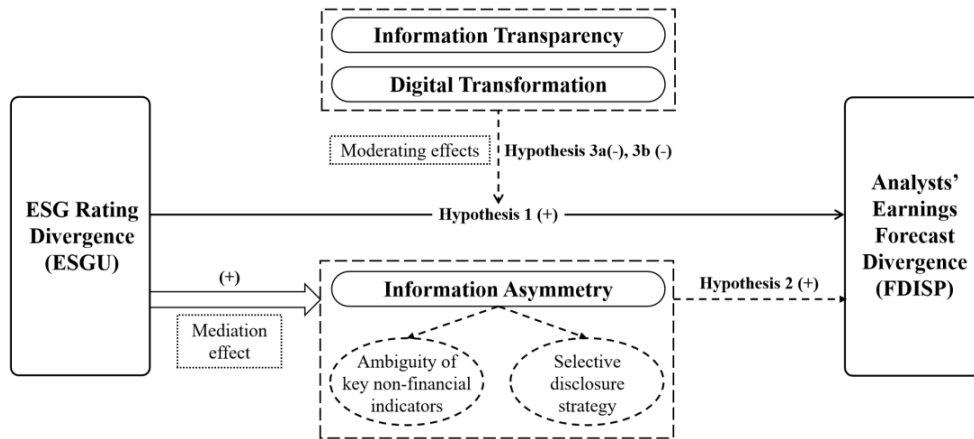


Figure 1: Theoretical model.

### 3. Model Design

#### 3.1. Data Sources and Sample Selection

This article takes A-share listed companies in China's capital market from 2009 to 2023 as the research sample, and handles the sample as follows in accordance with the convention: firstly, the samples of listed companies in the financial and insurance categories are excluded. Secondly, ST and \*ST listed companies are removed from the observation pool. Thirdly, observations with incomplete key variable data are filtered out. Finally, in order to eliminate the effect of extreme values, the continuous type variables are shrink-tailed at 1% and 99% quantile. Meanwhile, this paper performs the aggregated mean treatment on the data related to analysts' surplus forecasts, and finally obtains 16,353 annual-company sample observations. As for the source of ESG data, the ESG scores disclosed by the six rating agencies from the Wind database (CSI, Bloomberg, SynTao Green Finance, Wind, FTSE Russell, and Allied Wave) are selected as the benchmark data for calculating ESG rating divergence. The data related to analysts' earnings forecasts and other indicators are primarily originates from the CSMAR and CNRDS databases. The statistical analysis software is Stata 18.0.

#### 3.2. Model Setting and Variable Selection

To test the effect of ESG rating divergence on analysts' earnings forecast divergence, the following model (1) is constructed:

$$FDISP_{i,t} = \beta_0 + \beta_1 ESGU_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 SOE_{i,t} + \beta_4 LEV_{i,t} + \beta_5 CF_{i,t} + \beta_6 TOBINQ_{i,t} + \beta_7 BIG4_{i,t} + \beta_8 TOP1_{i,t} + \beta_9 ID_{i,t} + \beta_{10} FOLLOW_{i,t} + YEAR + FIRM + \varepsilon \quad (1)$$

ESGU is the core explanatory variable ESG rating divergence and FDISP is the core explanatory variable analysts' earnings forecast divergence. The model controls for fixed effects of year and enterprise, and the selection of specific variables in the above model (1) is explained as follows:

(i) Explained variable: analysts' earnings forecast divergence. Referring to previous related studies [15, 16], analysts' surplus forecasts and actual company surplus data are processed as follows: ① Removing the samples with missing data of EPS and announcement date, and removing the samples whose analysts' forecast date exceeds the release date of the annual report. ② Retaining only the analysts' last surplus forecast data for each company. ③ Grouping the remaining surplus forecast data and calculating the mean value and standard deviation. The formula for analysts' earnings forecast divergence is shown in equation (2) below:

$$FDISP = \frac{sd(FEPS - AEPS)}{abs(AEPS)} \quad (2)$$

Where AEPS is the actual earnings of the company and FEPS is the mean of analysts' earnings forecasts.

(ii) Explanatory variable: ESG rating divergence. In this article, ESG rating divergence is measured by the mean value of paired rating divergence of all rater pairs [17]. The specific operation process is as follows: ① Uniform standard processing to ensure that the data weights are the same. ② Rank the ESG scores of the six rating agencies by year. ③ Standardize the rating rankings. ④ Combine any two agencies involved in the ratings for that year, thus forming 12 rating pairs. At the same time, the standard deviation of the standardized rankings of the two agencies in each pair is calculated as the "pairwise rating divergence". ⑤ Calculate the average of the "paired rating divergences" as the ESG rating divergence (ESGU) of the company for the year.

(iii) Control variables: Referring to previous studies [18, 19], this article considers and selects the following control variables from three aspects: basic characteristics of enterprises, financial and operational efficiency, and internal governance and external supervision. Detailed variable definitions and specifications are shown in Table 1.

Table 1: Definition of variables.

Variable type	Variable name	Variable symbol	Variable definition
Explained variable	Analysts' earnings forecast divergence	FDISP	Degree of dispersion in analysts' earnings forecasts
Explanatory variable	ESG rating divergence	ESGU	Mean pairwise rating dispersion among all raters
Control variables	Company size	SIZE	Natural logarithm of year-end total assets
	Nature of ownership	SOE	State-owned enterprise dummy (1 for SOEs, 0 otherwise)
	Leverage ratio	LEV	Total liabilities to total assets ratio
	Cash flow ratio	CF	Net cash flow from operating activities to total assets
	Tobin's Q	TOBINQ	Ratio of market value to replacement capital
	Big 4 audit	BIG4	1 if the company is audited by the Big 4 (PwC, Deloitte, KPMG, Ernst & Young), 0 otherwise
	Largest shareholder ownership percentage	TOP1	Number of shares held by the largest shareholder to total shares
	Independent director ratio	ID	Number of independent board members to total board members
	Analyst coverage	FOLLOW	Natural logarithm of (1 + number of analyst teams following the firm)

Table 1: (continued).

Added control variables	Management shareholding ratio	MSHARE	Number of shares held by directors / the total number of share capital
	Duality	DUAL	1 if the chairman and the CEO is the same person, 0 otherwise

## 4. Empirical Analysis

### 4.1. Descriptive Statistics

Table 2 presents the descriptive statistics of the main variables. The extreme values of FDISP and ESGU are 0.010-5.660 and 0.010-0.540, respectively, indicating significant deviations between analyst earnings forecasts and ESG ratings for the same company. The mean value of the control variable, BIG4, is 0.120, indicating that about 12% of firms choose Big 4 audits, which is slightly higher than the corresponding previous data [16]. The results for the other control variables are similar to the existing results.

Table 2: Descriptive statistics.

Variable	N	Mean	p50	SD	Min	Max
FDISP	16353	0.370	0.140	0.740	0.0100	5.660
ESGU	16353	0.190	0.170	0.130	0.0100	0.540
SIZE	16353	22.94	22.75	1.350	20.58	26.94
SOE	16353	0.360	0	0.480	0	1
LEV	16353	0.440	0.440	0.190	0.0600	0.850
CF	16353	0.0600	0.0600	0.0700	-0.130	0.260
TOBINQ	16353	2.070	1.630	1.350	0.780	8.360
BIG4	16353	0.120	0	0.320	0	1
TOP1	16353	35.59	33.60	15.77	8.420	76.31
ID	16353	37.60	36	5.630	33	57
FOLLOW	16353	2.350	2.400	0.810	0.690	3.910

### 4.2. Benchmark Results and Mediation Effects Analysis

#### 4.2.1. Benchmark Results

Column (1) of Table 3 demonstrates the benchmark results. The regression coefficient of analysts' earnings forecast divergence is significant at 1% level. This indicates that ESG rating divergence significantly increases analysts' earnings forecast divergence. Hypothesis 1 is validated. The reason for this is that when ESG rating divergence is too large, analysts are affected by the “noise effect”, which may lead to misjudgment. At the same time, analysts may question the reliability of ESG data and incorporate more subjective judgments, leading to higher earnings forecast divergence.

#### 4.2.2. Mediating Effects Analysis

As mentioned in the previous analysis, the ambiguity of key non-financial indicators forces analysts to rely on other sources for information. At the same time, selective disclosure of data by some companies will further exacerbate information asymmetry, leading analysts to modify earnings forecasts multiple times and ultimately exacerbating the divergence of their earnings forecasts. The

study uses stepwise regression method [20] to examine the mediating effect of information asymmetry and constructs mediating effect models (3) and (4):

$$ASY_{i,t} = \beta_0 + \alpha ESGU_{i,t} + \beta_k Controls_{i,t} + YEAR + FIRM + \varepsilon \quad (3)$$

$$FDISP_{i,t} = \beta_0 + \gamma ESGU_{i,t} + \varphi ASY_{i,t} + \beta_k Controls_{i,t} + YEAR + FIRM + \varepsilon \quad (4)$$

Where ASY denotes information asymmetry. Referring to previous studies [21, 22], the composite indicator ASY is constructed by constructing three stock liquidity indicators (LR, ILL, and GAM), analyzing and extracting common variance information. Column (2) and (3) of Table 3 presents the test results. The regression results indicate that there is a partial mediating effect of information asymmetry. The increase in information asymmetry further exacerbates analysts' earnings forecast divergence. Hypothesis 2 is validated.

Table 3: Benchmark results and mediating effects analysis.

	(1) FDISP	(2) ASY	(3) FDISP
ESGU	0.184*** (0.0546)	0.0521*** (0.0189)	0.180*** (0.0546)
ASY			0.0607** (0.0253)
_Cons	0.687 (0.456)	7.626*** (0.158)	0.224 (0.495)
Year FE		Yes	
Firm FE		Yes	
Controls		Yes	
N	16353	16353	16353
R <sup>2</sup>	0.031	0.575	0.032
adj. R <sup>2</sup>	-0.218	0.466	-0.217

Notes: \*\*\* means p-value <0.01, \*\* denotes p-value <0.05, \* implies p-value <0.1

### 4.3. Robustness Test

#### 4.3.1. Endogeneity Test

In order to mitigate the impact of endogeneity problem on the research results, the article divides the control group and the treatment group according to the median ESG rating divergence (ESGU) of the industry to which the sample belongs, and chooses the PSM method to match the sample and regress it. The results show that the regression coefficients of ESGU are still significantly positive, and the regression results still support the hypotheses of this article (table omitted for space limitation).

#### 4.3.2. Variable Adjustment

This article uses two methods for variable adjustment: (i) Replacement of explained variables. Referring to the previous study [23], the denominator of analyst earnings forecast bias is adjusted to the opening stock price. (ii) Adding control variables: MSHARE and DUAL. The regression results still support the hypothesis (table omitted for space limitation).

## 4.4. Moderating Effects Analysis

### 4.4.1. The Moderating Role of Corporate Transparency

High-transparency companies can mitigate the ambiguity of ESG data through standardized disclosure, while avoiding analysts' overreaction to rating differences. Based on this, this article constructs model (5) to test the moderating effect mechanism of corporate transparency.

$$FDISP_{i,t} = \beta_0 + \beta_1 ESGU_{i,t} + \beta_2 ESGU_{i,t} \times TRANS_{i,t} + \beta_k Controls_{i,t} + YEAR + FIRM + \varepsilon \quad (5)$$

In equation (5), TRANS denotes the transparency of accounting information. The regression results, as shown in column (1) of Table 4, show that the cross-multiplier term is significant negative at the 5% level, which suggests that the worse the firm's transparency, the stronger the contribution of ESG rating divergence to analysts' earnings forecast divergence. Hypothesis 3a is validated.

### 4.4.2. The Moderating Role of Digital Transformation

Enterprise digital transformation can improve the transmission efficiency of ESG data and allows analysts to directly trace back to the data source. Based on this, this article constructs the following model (6) to test the moderating effect mechanism of digital transformation.

$$FDISP_{i,t} = \beta_0 + \beta_1 ESGU_{i,t} + \beta_2 ESGU_{i,t} \times DCG_{i,t} + \beta_k Controls_{i,t} + YEAR + FIRM + \varepsilon \quad (6)$$

In equation (6), DCG denotes the digital transformation level of the enterprise. The regression results are shown in column (2) of Table 4, and the cross-multiplier term is significant negative at the 5% level, which indicates that the lower the level of firms' digital transformation, the stronger the contribution of ESG rating divergence to analysts' earnings forecast divergence. Hypothesis 3b is tested.

Table 4: Moderating effects analysis.

	(1) FDISP		(2) FDISP
ESGU	0.580*** (0.164)		0.249*** (0.0639)
TRANS	-1.341*** (0.0954)		
ESGU*TRANS	-0.840** (0.327)		
DCG			1.579** (0.731)
ESGU*DCG			-4.215** (2.137)
_Cons	0.975** (0.450)		0.722 (0.458)
Year FE		Yes	
Firm FE		Yes	
Controls		Yes	
N	16353		16353
R <sup>2</sup>	0.062		0.032
adj. R <sup>2</sup>	-0.179		-0.217

Notes: \*\*\* means p-value <0.01, \*\* denotes p-value <0.05, \* implies p-value <0.1

## 4.5. Heterogeneity Analysis

### 4.5.1. Based on the Degree of Industry Competition

Monopolies usually have stronger market power and redundant resources [24], and their ESG practices are more inclined to strategic packaging rather than substantial enhancement of social value [25]. In this case, it is often difficult for analysts to distinguish between real corporate performance and strategic disclosure. Referring to previous studies [26], industry concentration is measured by HHI to further reflect the degree of industry competition. The regression result indicates that the effect of ESG rating divergence on analysts' earnings forecast divergence is more significant for firms with lower industry competitiveness, and the results are in line with expectations.

### 4.5.2. Based on the Degree of Corporate Pollution

Heavily polluting firms tend to face higher environmental regulatory pressures and public scrutiny [27]. In addition, the ESG data of heavy polluters are more complex and therefore more likely to exacerbate the degree of earnings forecast divergence. The regression result indicates that the effect of ESG rating divergence on analysts' earnings forecast divergence is more significant among heavily polluting firms, and the results are in line with expectations.

### 4.5.3. Based on Competitive Strategy

Differentiated firms tend to build competitive advantage through innovation investment and brand reputation [28]. Their ESG practices tend to be more long-term value-oriented and ESG inputs are mostly traceable and substantial. Therefore, even if there are differences in ESG scores by rating agencies, analysts can still calibrate the prediction model with hard data such as the number of patents and the progress of technology commercialization [29]. The regression result indicates that the effect of ESG rating divergence on analysts' earnings forecast divergence is more significant for firms with cost-leading strategies, and the results are in line with expectations.

Table 5: Heterogeneity Analysis.

	HHI		Pollution		Strategy	
	High	Low	Severe	Non-severe	Differen- tiation	Cost Leadership
	(1)	(2)	(3)	(4)	(5)	(6)
	FDISP	FDISP	FDISP	FDISP	FDISP	FDISP
ESGU	0.128*	0.246***	0.223*	0.162***	0.150**	0.215**
	(0.0711)	(0.0729)	(0.118)	(0.0552)	(0.0676)	(0.0864)
_Cons	2.077***	-1.419*	-0.139	0.922	0.363	1.123
	(0.736)	(0.782)	(1.275)	(0.597)	(0.759)	(0.894)
Controls				Yes		
<i>N</i>	7882	7817	3778	11889	8354	6810
<i>R</i> <sup>2</sup>	0.275	0.278	0.240	0.290	0.331	0.281
adi. <i>R</i> <sup>2</sup>	0.138	0.112	0.093	0.134	0.153	0.110
Chow test	6.76		13.66		4.66	
P-value	0.0000		0.0000		0.0000	

Notes: \*\*\* means p-value <0.01, \*\* denotes p-value <0.05, \* implies p-value <0.1

## 5. Conclusion

This study empirically examines the mechanism of ESG rating divergence on analysts' earnings forecast divergence by using matched data from Chinese A-share listed firms (2009-2023). It is found that ESG rating divergence significantly exacerbates analysts' earnings forecast divergence, and its path of action is mainly realized through exacerbating information asymmetry. Extended analysis demonstrates that enhanced corporate information transparency and accelerated digital transformation significantly counteract this adverse effect. Heterogeneity analysis illustrates that the effect of ESG rating divergence on analysts' forecast divergence is more pronounced among firms with low industry competition, heavily polluting industries, and cost leadership strategies.

The findings of the study have the following three insights: Firstly, rating agencies should improve the transparency of ESG rating frameworks and reduce rating bias caused by methodological differences. Regulators should accelerate the development of a unified ESG disclosure standardization to reduce the room for selective disclosure. Secondly, companies should strengthen information transparency and digital transformation to enhance the credibility and comparability of disclosed data. Thirdly, regulators should consider implementing differentiated ESG regulatory policies and ultimately achieving synchronous improvement of ESG governance efficiency and market information quality.

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