

Can Enterprise Digital Transformation Alleviate the Value Shock Caused by ESG Rating Divergence?

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Abstract: Under the context of China's "dual carbon" strategy and the development of the digital economy, ESG has become a key benchmark for measuring corporate sustainable development. However, divergences in ESG ratings increase information uncertainty and may depress corporate value. This paper uses Chinese A-share listed companies from 2015 to 2023 as a sample, employing regression and moderation effect analysis to examine the impact of ESG rating divergences on corporate value and the moderating role of digital transformation. The findings indicate that: (1) ESG rating divergences significantly reduce corporate value, reflecting a decline in market trust in the quality of ESG information; (2) digital transformation can significantly mitigate this negative effect, particularly in companies with a higher level of digitalization; (3) in non-state-owned enterprises and firms with concentrated leadership, the buffering effect of digital transformation is stronger, highlighting its function in optimizing information in contexts with weaker governance and lower transparency. This paper extends research on the mechanisms through which ESG rating divergences affect corporate value from the perspective of digital transformation and provides empirical evidence and reference for companies to optimize ESG information disclosure and digital strategy, as well as for government policies promoting integrated development.

Keywords: ESG Rating Divergence; Enterprise Value; Digital Transformation; Dual Synergy.

1. Introduction

The report to the 20th National Congress of the Communist Party of China clearly states that "promoting the greening and low-carbon development of the economic and social development is a key link in achieving high-quality development". This strategy not only reflects the essential requirements of Chinese-style modernization, but also is highly consistent with the concept of ESG (Environment, Social, and Governance). In recent years, the ESG concept has attracted great attention from all sectors of society, and enterprises and investors have begun to realize the importance of ESG to the long-term corporate value and sustainable development of enterprises. As an important bridge connecting ESG investment and corporate sustainable practices, ESG rating plays an indispensable role in capital allocation, resource guidance and investment decision-making, and is regarded as the core link of the ESG value chain. However, the phenomenon of ESG rating divergence has become increasingly prominent—different rating agencies often show significant differences in their evaluation results of the same enterprise, and such differences have structural and universal characteristics. The causes and impacts of this phenomenon have become a widespread focus of attention in academic and industrial circles.

ESG rating divergence may exert multiple impacts on enterprise value and the operation of the capital market: from the perspective of investors, rating differences exacerbate information asymmetry and signal distortion, increasing the uncertainty of investment decisions and risk exposure; from the perspective of enterprises, inconsistent ratings weaken the market's confidence in their sustainable development capabilities, thereby affecting financing costs, capital inflows and brand reputation; from the perspective of supervision and policy-making, a highly differentiated rating system may reduce the effectiveness of policy tools and lower the

enforcement of ESG institutional arrangements. Existing studies have pointed out that rating divergence will lead to enterprise valuation discounts by amplifying information uncertainty [1].

At the same time, the Third Plenary Session of the 20th Central Committee of the Communist Party of China clearly stated that "supporting enterprises in upgrading traditional industries with digital-intelligent technologies and green technologies". The *Implementation Guidelines for the Coordinated Transformation and Development of Digital transformation and Greening* also emphasizes "empowering green transformation with Digital transformation and promoting integrated innovation between Digital transformation and greening". Driven by both policy guidance and technological progress, the coordinated advancement of digital transformation and green transformation has become an important strategic path for China's economic and social development. Digital transformation is not only a core trend of economic structural reform, but also a key strategic choice for enterprises to address challenges such as climate change, resource constraints and sustainable development. Especially against the backdrop that ESG rating divergence may bring operational risks and market fluctuations, Digital transformation has the potential to become an effective tool to mitigate such negative impacts.

From a theoretical perspective, corporate digital transformation can mitigate the adverse effects of ESG rating discrepancies through multiple channels. On one hand, digital technology enhances the efficiency of information collection, processing, and disclosure, shortens information chains, and reduces noise and bias in information transmission; on the other hand, digitalization increases the quantifiability and verifiability of non-financial information, broadens the channels through which rating agencies can obtain data on environmental performance, social responsibility, and

governance structures, and reduces evaluation discrepancies caused by insufficient information or excessive interpretive space. Moreover, the advantages of digital tools in terms of data transparency, traceability, and real-time availability help improve the objectivity and comparability of ESG ratings, providing investors and regulators with more stable decision-making bases. However, current research still has shortcomings in two aspects: first, the conclusions on the impact of discrepancies in ESG ratings on firm value are inconsistent, particularly in the context of China's unique institutional and policy environment, where the direction and intensity of these effects remain unclear and require further exploration; second, the potential moderating role of digital transformation lacks empirical examination, especially regarding the mechanism pathways and differentiated effects under the policy orientation of 'digitalization-greening synergy,' which remains an important area for future research.

Based on the research questions outlined above, this study takes ESG rating divergence as the core explanatory variable and incorporates corporate digital transformation into the analytical framework as a key moderating variable. A moderation effect model is constructed to systematically explore the mechanism by which digital transformation mitigates the adverse impact of ESG rating divergence on firm value. The specific research objectives are: (1) to examine the direction and intensity of the impact of ESG rating divergence on firm value; (2) to analyze the moderating role of corporate digital transformation in this relationship, clarifying the scenarios in which it exerts a buffering effect; and (3) to assess the differentiated effects of the 'dual transformation synergy' policy under the heterogeneity of property rights and leadership structures.

This study theoretically deepens the understanding of the mechanism by which digital transformation mitigates the negative effects of ESG rating discrepancies, addresses controversies regarding the impact of ESG evaluation divergences, and expands the research boundaries at the intersection of digital governance and sustainable finance. Practically, the study's findings offer feasible pathways for enterprises to optimize their sustainable development strategies, improve information disclosure systems, and enhance digital governance capabilities under the 'dual synchronization' strategy. Furthermore, they provide empirical support for the government and regulatory authorities in formulating policy tools that integrate green and digital development, thereby contributing to achieving high-quality, resilient, and sustainable economic growth in China driven by both green and digital advancements.

2. Theoretical Analysis and Research Hypotheses

2.1. ESG Rating Discrepancies and Corporate Value

Good ESG performance helps enhance corporate value[2], but the existence of rating discrepancies makes it difficult to accurately assess a company's ESG performance and can trigger a series of negative effects[3]. According to signaling theory, ESG ratings provide investors and other stakeholders with important signals for assessing a company's sustainability capabilities; however, rating discrepancies can weaken this signaling effect, exacerbate information asymmetry, and lead to market expectation instability[4]. Based on stakeholder theory, although ESG ratings can to

some extent mitigate information asymmetry, when rating differences are significant, they may produce a 'hedging effect,' reducing their positive impact and potentially affecting corporate value.

Existing research indicates that discrepancies in ESG ratings can reduce the quality of ESG information disclosure, undermine the effectiveness and credibility of such disclosures, and increase corporate financing constraints, thereby heightening the uncertainty of sustainable operations[5]. In this context, investors may question a company's sustainable development potential and debt repayment ability, which in turn could suppress investment willingness and efficiency[6], elevate operational risks[7], and negatively impact corporate value. Moreover, divergences in ESG ratings may further hinder value creation by weakening innovation capabilities and reducing human capital accumulation. Based on the above analysis, this paper proposes its first research hypothesis:

H1: Significant discrepancies in ESG ratings suppress corporate value, meaning that the greater the divergence in a company's ESG ratings, the lower its value.

2.2. The Moderating Role of Digital Transformation

Digital transformation, relying on the in-depth application of technologies such as big data, cloud computing, and artificial intelligence, can significantly enhance the transparency, verifiability, and timeliness of corporate information disclosure, thereby reducing information gaps and subjective biases during the assessment process by rating agencies, and mitigating the adverse impact of ESG rating discrepancies on corporate value. Existing research indicates that digital transformation can improve operational efficiency and profitability by strengthening informationization, building resource barriers, and promoting business model innovation, while also playing a positive moderating role in the relationship between ESG performance and corporate value. By enhancing data processing and analytical capabilities, it improves information efficiency and sharing, enabling stakeholders to more accurately evaluate a company's ESG performance. At the same time, digital transformation promotes R&D investment and innovation output, elevating the level of green innovation, and enhancing the accessibility and utilization of information. Furthermore, digital transformation not only significantly improves production efficiency but also drives more non-financial information disclosure, optimizes internal governance and decision-making capabilities, making ESG ratings more aligned with the company's actual performance, thereby further reducing rating discrepancies. Based on the above analysis, this paper proposes the second research hypothesis:

H2: Digital transformation plays a positive moderating role in the relationship between ESG rating disagreements and corporate value, meaning that the higher the level of digital transformation, the weaker the negative impact of rating disagreements on corporate value.

3. Research Design

3.1. Sample Selection and Data Sources

This study selects A-share listed companies from 2015 to 2023 as the research sample. The sample period starts from 2015, mainly because the Environmental Protection Law revised and implemented that year significantly strengthened

environmental regulation, promoted standardized ESG information disclosure, and facilitated the rise of domestic ESG rating agencies. Following existing research, the sample processing steps are as follows: (1) excluding listed companies in the financial industry; (2) excluding companies in abnormal trading status such as ST and *ST; (3) excluding samples with missing core variables; (4) A 1% winsorization was applied to continuous variables. Ultimately, 14,858 firm-year observations were obtained. The SynTao ESG rating data comes from the SynTao ESG Rating Service Platform, while Bloomberg ESG rating data is sourced from Bloomberg Index Services Limited; FTSE Russell ESG ratings, Wind ESG ratings, Mergent ESG ratings, and Huazheng ESG ratings are all obtained from the Wind database. Data on corporate digital transformation and financial information are sourced from company annual reports and the CSMAR (China Stock Market & Accounting Research) database.

(1)Dependent variable: firm value (Tobin's Q)

This article uses Tobin's Q as a proxy variable for corporate value. This indicator, which is the ratio of a company's market value to the replacement cost of its assets, can effectively reflect the company's market valuation, growth potential, and resource allocation efficiency.

(2)Explanatory variable: ESG rating divergence (ESGdif)

Referring to the research of He Taiming et al. , Li Puling et al. , and Avramov et al.[8] , this paper selects the ESG rating scores of six institutions, namely China Securities, Wind,

FTSE Russell, SynTao Green Finance, Menglang, and Bloomberg, and calculates the standard deviation after assigning the ratings of each institution uniformly, and uses this standard deviation to measure the degree of ESG rating divergence.

(3)Moderating variable: Digital Transformation (DT)

This paper draws on the research approach of Chenyu Zhao and others, and categorizes digitalization into four dimensions: digital technology applications, Internet business models, intelligent manufacturing, and modern information systems. It then statistically analyzes the frequency of digital-related terms and takes the logarithm, thereby providing a comprehensive reflection of the degree of digital transformation in enterprises.

(4)Control variable: To exclude the impact of factors other than ESG rating differences on corporate value, and with reference to existing research , control variables such as listing age (ListAge), company size (Size), return on assets (ROA), leverage (Lev), cash flow level (Cashflow), proportion of fixed assets (FIXED), revenue growth rate (Growth), proportion of independent directors (Indep), ownership concentration (Top1), and institutional investor shareholding ratio (INST) were selected. The model also introduces time fixed effects and individual fixed effects to control for macroeconomic fluctuations and firm-specific characteristics that do not change over time. The specific definitions of the variables are shown in Table 1.

Table 1. Variable Definitions

Variable Type	Variable Name	Variable symbol	Variable Definition
Dependent variable	Corporate Value	Tobin's Q	$\text{Tobin's Q} = \frac{\text{Year-end stock price} \times \text{Number of outstanding shares} + \text{Net asset value per share} \times \text{Number of non-tradable shares} + \text{Book value of liabilities}}{\text{Total assets for the year}}$
explanatory variable	ESG rating discrepancies	ESGdif	The standard deviation of the standardized rankings provided by six rating agencies
Moderating variable	Digital Transformation	DT	$\ln(\text{Total Word Frequency of Digital Transformation})$
Control variable	Age of Listing	ListAge	$\ln(\text{Year of production} - \text{Year of listing} - 1)$
	Company size	Size	Natural logarithm of the company's total assets
	Return on Total Assets	ROA	$\text{Net Profit} / \text{Average Total Assets}$
	Debt-to-asset ratio	Lev	$\text{Year-end Total Liabilities} / \text{Total Assets}$
	Cash flow level	Cashflow	$\text{Net cash flow from operating activities} / \text{Total assets}$
	Proportion of Fixed Assets	FIXED	$\text{Net Fixed Assets} / \text{Total Assets}$
	Revenue Growth Rate	Growth	$\frac{\text{This year's revenue}}{\text{Last year's revenue}} - 1$
	Proportion of Independent Directors	Indep	$\frac{\text{Number of Independent Directors}}{\text{Total Number of Board Directors}}$
	Equity concentration	Top1	Shareholding ratio of the largest shareholder
	Proportion of shares held by institutional investors	INST	The total shares held by institutional investors divided by the tradable shares

3.2. Model Building

To examine the impact of ESG rating discrepancies on firm value (Hypothesis 1), this paper constructs the following two-way fixed effects regression model:

$$\text{Tobin's } Q_{i,t} = \alpha_0 + \alpha_1 \text{ESGdif}_{i,t} + \alpha_2 \text{Controls}_{i,t} + \text{year}_t + \lambda_i + \varepsilon_{i,t} \quad (1)$$

In the equation, i and t respectively represent data for the i -th firm and the t -th year; Tobin's $Q_{i,t}$ represents firm value; $\text{ESGdif}_{i,t}$ represents the degree of divergence in the firm's ESG ratings; $\text{Controls}_{i,t}$ represents the control variables;

$$\text{Tobin's } Q_{i,t} = \alpha_0 + \alpha_1 \text{ESGdif}_{i,t} + \alpha_2 \text{DT}_{i,t} + \alpha_3 \text{DT}_{i,t} \times \text{ESGdif}_{i,t} + \alpha_4 \text{Controls}_{i,t} + \text{year}_t + \lambda_i + \varepsilon_{i,t} \quad (2)$$

In the equation, $\text{DT}_{i,t}$ represents the degree of digital transformation of the enterprise, and the other variables are defined the same as in model (1). The moderating variable has been centralized, and the expected interaction term $\text{DT}_{i,t} \times \text{ESGdif}_{i,t}$ has a significantly positive coefficient α_3 , indicating that digital transformation can mitigate the negative impact of ESG discrepancies on corporate value.

4. Empirical Results and Analysis

4.1. Descriptive Statistics

Table 2 presents the descriptive statistics of the main variables. The mean firm value (Tobin's Q) is 2.041 (standard deviation = 1.133), with a range of [0.850, 7.322]. The mean is significantly higher than the median (1.699), indicating a right-skewed distribution, where a few highly valued firms elevate the overall level, while the majority of firms fall within the low-to-medium valuation range. The mean ESG rating disagreement (ESGdif) is 0.156 (standard deviation = 0.135), with a minimum of 0 (no disagreement) and a maximum of 0.523, reflecting the prevalence of rating differences and considerable variation among firms. The

year_t represents the time fixed effects; λ_i represents the individual fixed effects; and $\varepsilon_{i,t}$ is the random error term. The focus in Model (1) is on the coefficient α_1 of $\text{ESGdif}_{i,t}$, which is theoretically expected to be significantly negative, indicating that the greater the divergence in ESG ratings, the lower the firm value. To further examine the moderating effect of digital transformation on the relationship between ESG rating divergence and corporate value (Hypothesis 2), an interaction term between digital transformation and ESG rating divergence is introduced based on Model (1) to construct an extended model:

mean digital transformation (DT) score is 3.204 (standard deviation = 1.087), ranging from 0 to 5.787, suggesting a gradient distribution in the digitalization levels of the sample firms. Other control variables, such as ROA (mean 0.041) and Lev (mean 0.403), fall within reasonable ranges and are consistent with existing literature.

The results of the multicollinearity test show that the variance inflation factors (VIF) are all below 2.5 (with the maximum value of Size being 2.25), and the average is only 1.44, which is far below the empirical threshold of 10, indicating that there is no significant multicollinearity in the model.

Correlation analysis shows that the Pearson correlation coefficient between ESG rating divergence (ESGdif) and firm value (Tobin's Q) is -0.247, which is significant at the 1% level ($p < 0.01$). This result provides preliminary support for hypothesis H1, indicating that rating divergence is significantly negatively related to market valuation of firms. From an economic perspective, the absolute value of the coefficient reaches 0.247, suggesting a strong inhibitory effect on firm value.

Table 2. Descriptive Statistics of Major Variables

Variable	Observation	Mean	Standard deviation	Minimum value	Median	Maximum value	VIF
Tobin's Q	14858	2.041	1.133	0.850	1.699	7.322	1.40
ESGdif	14858	0.156	0.135	0	0.134	0.523	1.10
DT	14858	3.204	1.087	0	3.258	5.787	1.15
ListAge	14858	2.178	0.744	0.693	2.197	3.367	1.48
Size	14858	22.27	1.177	20.20	22.09	25.89	2.25
ROA	14858	0.041	0.062	-0.191	0.040	0.218	1.94
Lev	14858	0.403	0.179	0.068	0.403	0.829	1.68
Cashflow	14858	0.053	0.063	-0.115	0.050	0.241	1.43
FIXED	14858	0.220	0.125	0.021	0.199	0.585	1.19
Growth	14858	0.140	0.299	-0.452	0.096	1.522	1.22
Indep	14858	37.85	5.429	33.33	36.36	57.14	1.02
Top1	14858	0.320	0.136	0.086	0.299	0.687	1.33
INST	14858	0.394	0.243	0.002	0.399	0.887	1.61

4.2. ESG Rating Discrepancies and Corporate Value Regression Results

Table 3 reports the regression analysis results of the impact of ESG rating divergence on firm value. Column (1) shows that in the baseline model without any control variables, the coefficient of ESGdif is -0.8089 ($t = -12.5450$, $p < 0.01$), which is significantly negative at the 1% level. Column (2) indicates that after introducing control variables for firm

characteristics, the coefficient is -0.7922 ($t = -13.2271$, $p < 0.01$), with the negative significance remaining unchanged. Column (3) further includes corporate governance control variables, adjusting the coefficient to -0.7492 ($t = -12.7813$, $p < 0.01$), which remains robust in both statistical significance and economic magnitude. As control variables are progressively added, the model's adjusted R^2 increases from 0.2808 to 0.3808, indicating a significant enhancement in explanatory power. The results suggest that ESG rating

divergence has a persistent and significant inhibiting effect on firm value, providing empirical support for Hypothesis H1.

4.3. The Moderating Effect of Digital Transformation

The results in column (4) of Table 3 show that digital transformation (DT) plays a significant positive moderating role in the relationship between ESG rating divergence and firm value. The coefficient of the interaction term (ESGdif×DT) is 0.0916 ($t = 1.7504$, $p < 0.1$), which is opposite in sign to the significantly negative coefficient of the

core explanatory variable ESGdif ($\alpha = -0.7583$, $p < 0.01$). This indicates that corporate digital transformation can mitigate the adverse impact of ESG rating divergence on firm value, serving a "buffering" function. As the level of digitalization increases, the efficiency of information processing and transmission, the transparency of external information, and the optimization of governance structures all improve, thereby reducing the market uncertainty caused by rating divergence. This finding is consistent with the theoretical mechanism of the "digital governance buffering effect," supporting the validity of Hypothesis H2.

Table 3. Regression Analysis Results of the Impact of ESG Rating Discrepancies on Firm Value

Variable	(1)	(2)	(3)	(4)
	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q
ESGdif	-0.8089*** (-12.5450)	-0.7922*** (-13.2271)	-0.7492*** (-12.7813)	-0.7583*** (-12.8639)
DT				0.0221 (1.2488)
ESGdif×DT				0.0916* (1.7504)
ListAge		0.4072*** (7.6210)	0.4365*** (8.2527)	0.4381*** (8.2734)
Size		-0.6505*** (-12.5201)	-0.7559*** (-14.4947)	-0.7607*** (-14.5575)
ROA		2.8423*** (12.6156)	2.7144*** (12.2706)	2.7117*** (12.2858)
Lev		0.3712*** (2.6338)	0.5307*** (3.6793)	0.5310*** (3.6810)
Cashflow		0.5416*** (4.0202)	0.5431*** (4.1024)	0.5412*** (4.0950)
FIXED		0.2622 (1.4620)	0.3582* (1.9566)	0.3605** (1.9730)
Growth		0.0675** (2.5096)	0.0367 (1.3757)	0.0372 (1.3924)
Indep			0.0036 (1.5585)	0.0037 (1.5887)
Top1			-0.9379*** (-4.2108)	-0.9412*** (-4.2243)
INST			1.9593*** (13.4145)	1.9609*** (13.4219)
_cons	3.1827*** (85.6612)	16.2920*** (14.9527)	17.8606*** (16.0360)	17.8474*** (15.9977)
Time Fixed Effects	Yes	Yes	Yes	Yes
Individual fixed effects	Yes	Yes	Yes	Yes
N	14858	14858	14858	14858
R ²	0.2812	0.3534	0.3816	0.3819
adj. R ²	0.2808	0.3527	0.3808	0.3811

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively, with the values in parentheses representing the corresponding t-values; the same applies to the table below.

4.4. Endogeneity and Robustness Tests

(1) Replace the dependent variable

Considering that corporate value can be measured by multiple indicators, in order to eliminate potential result deviations caused by different methods of measuring

corporate value, this paper uses the price-to-book ratio (PB) as a proxy variable for corporate value for robustness testing. Column (1) in Table 4 shows that the ESG rating divergence coefficient is -0.9985 and is significant at the 1% level, consistent with the research hypothesis mentioned earlier. The research results are highly robust.

(2) Include industry fixed effects

To control for the potential interference of structural characteristics of the industry on the estimation results, this study incorporates industry fixed effects on the basis of two-way fixed effects (individual and time). The triple control framework can absorb industry heterogeneity that does not change over time (such as policy sensitivity and technology intensity). As shown in column (2) of Table 4, the ESG rating disagreement coefficient is -0.7529 ($t = -12.8282$, $p < 0.01$), which is consistent with the baseline model.

(3) The explanatory variable lagged by one period

To mitigate potential reverse causality issues and capture the lagged effects of ESG divergence, this paper adopts the methodological design of Li Xiaoyan et al., conducting regression analysis with the explanatory variables lagged by one period. Column (3) of Table 4 shows that the coefficient of ESG rating divergence is -0.3494 ($t = -6.0472$, $p < 0.01$), remaining significantly negative at the 1% level, consistent with the research hypotheses proposed earlier. The results are

highly robust.

(4) Instrumental Variables Method

To mitigate the potential endogeneity bias of the impact of ESG rating discrepancies on corporate value, this study draws on the method of Yang Zhihua and Wang Maobin, selecting the industry-year average ESG rating discrepancy among peer firms (ESGdif_IV) as an instrumental variable. The first-stage regression results indicate that this instrumental variable is highly correlated with ESGdif ($F = 211.43$, $p < 0.01$), significantly exceeding the weak instrument threshold, and its effect primarily operates through an industry-level "assessment contagion" mechanism affecting corporate value, rather than directly influencing the fundamentals of individual companies, satisfying the exogeneity requirement. The two-stage least squares (2SLS) estimation shows that the driving effect of ESGdif_IV on ESGdif is significantly positive ($\alpha = 0.9999$, $t = 14.54$, $p < 0.01$), while the causal effect of ESG rating discrepancy on corporate value is -1.5587 ($t = -3.0753$, $p < 0.01$), consistent in direction and significance with the baseline regression results, indicating that the study's conclusions remain robust. The results demonstrate that the instrumental variable approach effectively strengthens the causal identification reliability of the inhibitory effect of ESG rating discrepancies on corporate value.

Table 4. Results of Endogeneity and Robustness Tests

Variable	(1)	(2)	(3)	(4)	(5)
	PB	Tobin's Q	Tobin's Q	ESGdif	Tobin's Q
ESGdif	-0.9985*** (-8.3984)	-0.7529*** (-12.8282)			-1.5587*** (-3.0753)
L.ESGdif			-0.3494*** (-6.0472)		
ESGdif_IV				0.9999*** (14.5400)	
_cons	43.1731*** (18.2938)	15.8334*** (14.5815)	16.7780*** (14.1772)	-0.2968*** (-8.1436)	11.4948*** (24.7403)
Control variable	Yes	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	Yes	No	Yes	Yes
Individual fixed effects	Yes	Yes	Yes	No	No
N	14844	14858	11391	14858	14858
R ²	0.4310	0.3861	0.2990	0.2986	0.3827
adj. R ²	0.4302	0.3845	0.2979	0.2964	0.3808

5. Heterogeneity Analysis

5.1. Analysis of Property Rights Heterogeneity

To investigate the impact of differences in property rights on the relationship between ESG rating divergence and corporate value, this study conducts grouped regressions based on whether a firm is state-owned. The results (see Table 5) show that ESG divergence (ESGdif) has a significant negative effect in both types of firms, but the extent of the impact differs noticeably. In the sample of non-state-owned enterprises, each one-unit increase in ESG divergence leads to a significant decrease of 0.7693 units in Tobin's Q ($t = -11.2243$, $p < 0.01$); whereas in the sample of state-owned enterprises, the same ESG divergence results in a decrease of

only 0.6965 units in valuation ($t = -6.1390$, $p < 0.01$). The intergroup difference test ($F = 8.94$, $p = 0.0028$) indicates that this difference is statistically significant. In other words, although both types of firms are negatively affected by ESG divergence, the valuation of non-state-owned enterprises is more sensitive to changes in divergence.

Further examining the moderating effect of the level of digitalization (DT), it was found that it exhibits differentiated characteristics across enterprises with different ownership types. In non-state-owned enterprises, the interaction term between ESG divergence and digital transformation has a coefficient of 0.1435 ($t = 2.3725$, $p < 0.05$), which is significantly positive, indicating that digital transformation can to some extent mitigate the valuation discount caused by ESG divergence. In state-owned enterprises, however, this

interaction term is not significant, suggesting that an increase in the level of digitalization does not have a noticeable effect on the relationship between ESG divergence and valuation.

From the perspective of data characteristics, non-state-owned enterprises differ from state-owned enterprises in terms of financing dependence, transparency of information disclosure, and market competition pressure, which may lead the market to react more sharply to ESG rating discrepancies. At the same time, digital transformation may help non-state-

owned enterprises mitigate investors' concerns arising from rating differences by improving information processing efficiency and disclosure quality, thereby partially offsetting their negative impact. In contrast, state-owned enterprises benefit from stable policy support and strong external credit endorsement, making their valuations less sensitive to ESG discrepancies. In this context, changes in the level of digitalization have a relatively limited impact on market reactions.

Table 5. Results of Heterogeneity Test by Ownership Type

Variable	State-owned enterprise	Non-state-owned enterprise	State-owned enterprise	Non-state-owned enterprise
	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q
ESGdif	-0.6965*** (-6.1390)	-0.7693*** (-11.2243)	-0.6973*** (-6.1963)	-0.7873*** (-11.3722)
DT			0.0121 (0.3945)	0.0123 (0.5687)
ESGdif×DT			0.0449 (0.4311)	0.1435** (2.3725)
_cons	18.7713*** (8.2182)	16.8580*** (13.0442)	18.7084*** (8.1889)	16.7862*** (13.0203)
Control variable	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes
Individual fixed effects	Yes	Yes	Yes	Yes
N	4008	10779	4008	10779
R ²	0.7514	0.7468	0.7514	0.7471
adj. R ²	0.7097	0.6912	0.7096	0.6914

5.2. Heterogeneity of Leadership Structure

Table 6. Test Results of Leadership Structure Heterogeneity

variable	Holding Two Positions in One	Separation of positions	Holding Two Positions in One	Separation of positions
	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q
ESGdif	-0.7816*** (-7.4937)	-0.7169*** (-10.0509)	-0.8176*** (-7.6851)	-0.7210*** (-10.1362)
DT			0.0168 (0.5214)	0.0242 (1.1256)
ESGdif×DT			0.1559* (1.6867)	0.1006 (1.5549)
_cons	11.8674*** (9.5263)	18.8040*** (13.2253)	18.8056*** (13.1633)	18.8056*** (13.1633)
Control variable	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes
Individual fixed effects	Yes	Yes	Yes	Yes
N	4657	9813	4657	9813
R ²	0.7977	0.7606	0.7980	0.7608
adj. R ²	0.7326	0.7070	0.7328	0.7071

The grouped regression results in Table 6 indicate that corporate leadership structure plays a significant moderating role in the relationship between ESG rating divergence and firm value (Tobin's Q). Specifically, in firms where the CEO also serves as the board chairman, a one-unit increase in ESG divergence corresponds to a decrease of 0.7816 in Tobin's Q ($p < 0.01$); in non-dual-role firms, the decrease is 0.7169 ($p <$

0.01), indicating that the penalty is approximately 8.4% higher in the former. This suggests that, under a governance structure with highly concentrated leadership, the market responds more sensitively to divergences in ESG information.

Further analysis of the moderating role of digital transformation (DT) reveals that only in firms where the CEO and chairman roles are combined does the interaction term

have a coefficient of 0.1559 ($p < 0.10$), showing a significant positive effect. This indicates that DT can reduce the negative impact of ESG rating divergence by approximately 19.1% (calculated based on the baseline coefficient of -0.8176). In contrast, in firms where the CEO and chairman roles are separate, this moderating effect does not pass the significance test ($p \geq 0.10$), suggesting that DT has not yet significantly improved the market's response to ESG divergence in such firms.

From the perspective of outcome characteristics, enterprises with a dual-role structure are more likely to be interpreted by the market as governance risk signals due to concentrated decision-making power and relatively limited information flow and checks and balances, thereby amplifying valuation discounts. Digital transformation, however, may mitigate this negative impact to some extent by enhancing information transparency and governance efficiency. For enterprises without a dual-role structure, a decentralized governance framework can partially diffuse the impact of information asymmetry, but it may also weaken the marginal effect of digital technologies in optimizing governance.

6. Research Conclusion and Recommendations

Based on data from China A-share listed companies from 2015 to 2023, this study systematically examines the impact of ESG rating discrepancies on corporate value and its heterogeneity under different property rights and leadership structures, introducing digital transformation (DT) as a moderating variable for testing. The study finds that: (1) ESG rating discrepancies significantly suppress corporate value. This effect remains robust even after controlling for company characteristics and governance variables, indicating that rating inconsistencies can undermine the market's trust in ESG information quality and lead to valuation discounts. (2) There is significant heterogeneity based on property rights, with non-state-owned enterprises being more sensitive to ESG discrepancies and experiencing a noticeably higher penalty than state-owned enterprises. Investor reactions to ESG deficiencies in state-owned enterprises tend to be milder, possibly due to implicit policy guarantees and resource allocation capabilities. (3) Leadership structure affects the degree of valuation penalty; companies with the dual-role structure (where the CEO also serves as board chairman) face a significantly higher discount than non-dual-role firms, suggesting that concentrated leadership exacerbates information opacity risk. (4) Digital transformation has a selective mitigating effect, significantly weakening the negative impact of ESG discrepancies only in non-state-owned and dual-role enterprises, with the strongest moderating effect observed in dual-role firms. This indicates that digitalization is more effective in improving information quality and optimizing signaling in contexts where governance is relatively weak and transparency is insufficient.

Based on this, the following recommendations are

proposed: First, enhance the consistency and transparency of ESG information by standardizing disclosure criteria and aligning rating mechanisms to reduce the risk of discrepancies. Second, implement differentiated governance strategies: non-state-owned enterprises should strengthen the verifiability of ESG and market-oriented communication, while state-owned enterprises can leverage their resource advantages to promote industry standardization. Third, optimize governance structures: for enterprises where the roles of chairman and CEO are combined, reinforce independent supervision mechanisms and, where conditions permit, advance the separation of positions. Fourth, deeply integrate digitalization into ESG management, utilizing technologies such as big data and blockchain to enhance the authenticity and timeliness of information disclosure, which is particularly suitable for enterprises with concentrated leadership or low market trust.

This paper provides new evidence on the economic consequences of ESG rating divergence, the heterogeneity of property rights and leadership structures, and the moderating role of digital transformation, yet it has certain limitations: (1) the sample only covers China's A-shares, and its applicability across markets remains to be verified; (2) the measurement of divergence relies on differences among mainstream ratings, lacking support from multidimensional data; (3) the digital transformation indicators may be influenced by other strategic transformation factors; (4) the mechanism testing needs further depth and could be expanded by incorporating investor behavior and high-frequency data. Future research can further extend in terms of sample scope, indicator construction, and mechanism exploration.

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