

The Impact of Digital Transformation of Enterprises on the Quality of ESG Disclosure

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Abstract. The degree of digital transformation at businesses and its relationship to the amount of ESG disclosure have recently come under investigation due to the economy's shift to a new model. This study empirically examines the impact of digital transformation on the quality of ESG information disclosure using Chinese listed businesses from 2015 to 2024 as the research sample. It is based on the theory of information asymmetry and resource allocation. The above results indicate that the level of ESG reporting in the new business model will be relatively high. Based on the above analysis, the attention of analysts is a partial mediator, and marketisation positively strengthens the link between digitalisation and the quality of ESG disclosure. This effect is more pronounced for state-owned businesses and high-polluting industrial locations, according to the study of heterogeneity. In addition to the previous studies on the economic effects of digitalisation. The above research provides references to support the promotion of high-quality development in both areas.

Keywords: Enterprise Digital Transformation, Quality of ESG Information Disclosure, Analyst Focus, Marketisation Level, Heterogeneity Analysis

1. Introduction

Enterprise digital transformation has gradually been adopted to promote the construction of high-quality development in the context of an increasingly digital economy.

At the same time, environmental, social, and governance (ESG) data sharing has come to be seen as a sign of a business's ability to expand sustainably. Good-quality ESG disclosures by enterprises can reduce the information asymmetry between them and other parties, and thus increase capital allocation efficiency [1]. However, ESG information has strong non-standardised and subjective features, and the rating results of different agencies are also inconsistent [2].

Many studies have shown that digitalisation will enlarge the information environment for the company, optimise resource allocation and strengthen corporate governance [3-5]. Research on ESG disclosure quality largely focuses on corporate characteristics, governance structure, and institutional environment [6, 7]. However, empirical evidence directly linking digital transformation to ESG disclosure quality remains limited, and its underlying mechanisms and boundary conditions have not been systematically examined.

This paper employs a panel data two-way fixed effects model, measures digital transformation through text analysis, measures disclosure quality using the Huazheng ESG rating, and uses

instrumental variables and PSM to address endogeneity issues.

The three main contributions are as follows: First, they broaden the area of study on the economic effects of digitalization to encompass the particular facet of ESG disclosure quality.

Second, they present the path through which analysts view the transmission mechanism of this information. Third, Institutional factors (degree of marketisation) and firm characteristics (ownership structure and industry attributes) also influence the strength of the link between digitalisation and ESG reporting quality.

2. Review of the literature and research conjectures

2.1. Digital transformation and business results

Digitalisation refers to the application of new digital technologies in changing how a company operates and organising; cloud computing aims to optimise all of these by redesigning the company's organisational structure, business model and operating system. Based on previous studies, the enterprise has made the application of digital technology to improve its information environment and governance. Digital transformation has improved stock liquidity by reducing information asymmetry, and it has also enhanced the enterprise's ESG performance by improving resource allocation and technological innovation [3, 5]. In particular, in terms of risk management and information disclosure, financial technology and digital applications help strengthen corporate governance [4]. Disclosure quality is greatly impacted by corporate governance practices, including board independence and equity structure [8]. However, most of these studies focus on financial performance or overall ESG performance, with limited attention to the specific dimension of "disclosure quality".

2.2. Determinants of ESG disclosure quality

The quality of ESG reporting is influenced by several factors. Information asymmetry is a common drawback between companies and external stakeholders, and ESG information, due to its strong non-standardized characteristics, is more susceptible to the influence of the information environment on its disclosure quality [9]. Corporate governance procedures, particularly the independence of the board of directors and capital structure, are important factors affecting the quality of financial reporting [7]. Enterprise size, profitability and ownership structure are important determinants of ESG performance [6]. It is worth noting that analysts' scrutiny can exert external pressure on companies to improve the transparency of their communications, as these analysts act as a key intermediary in the capital markets. Nevertheless, the significance of analyst concentration in relation to ESG disclosure and digital transformation has not been well examined.

2.3. Digital transformation and ESG disclosure

The link between ESG criteria and digital transformation has been the subject of several recent research studies. According to previous studies, digital transformation enhances corporate ESG performance, with a greater impact on non-state-owned and competitive industries [1]. By enhancing internal control and green innovation, corporate digital transformation enhances ESG performance [6], and this positive effect is more significant in private enterprises and stronger in high-pollution industries [10-12]. However, these studies have three common limitations: (1) the studies use ESG composite scores rather than focusing specifically on disclosure quality; (2) the

mechanism tests focus on internal governance paths (such as internal control and green innovation) and ignore external supervision mechanisms such as analyst attention; (3) There is no systematic examination of the moderating influence of the external institutional context, such as the level of marketization.

2.4. Research gaps and hypotheses

The following theories are put out in this work in light of the aforementioned:

H1: ESG disclosure quality is greatly enhanced by the digital revolution. Digital transformation reduces information asymmetry by enhancing data integration and internal controls; simultaneously, it optimizes resource allocation and alleviates financing constraints, providing necessary resource support for high-quality ESG disclosure.

H2: The quality of ESG reporting and digital transformation are influenced by the attention analysts pay to them. The transformation reduces analysts' information-gathering costs, thus attracting more analysts to follow it; analysts, as external supervisors, encourage companies to improve their communication on ESG criteria by highlighting the benefits of transparency and emphasising the reputational risks involved.

H3: The quality of ESG information disclosure and the digital transformation can both benefit from market forces. In regions where the market plays a more significant role, the institutional environment and supervisory mechanisms are more well-developed, and improving the quality of ESG reports can be made easier by leveraging the advantages of digital transformation in information and business management.

3. Research framework

3.1. Variable definition

Table 1. Variable definition

Variable type	Variable name	Variable symbol	Variable definition
Explained variable	ESG Information Disclosure Quality	ESG	Huazheng ESG Rating Score
Core explanatory variables	Enterprise digital transformation	Digital	The Digital Transformation Index constructed by Wu Fei et al. (2021)
Mediator variables	Analyst attention	Analyst	$\ln(1 + \text{Analysts' follow-up numbers})$
Regulation variables	Marketization	Market	Regional marketization index
	Enterprise size	Size	$\ln(\text{Total Assets})$
	Debt-to-asset ratio	Lev	Total Liabilities / Total Assets
control variables	Return on equity	ROE	Net Profit / Equity
	growth potential	Growth	Revenue Growth Rate
	Operating cash flow	NetOCF	Operating Cash Flow / Total Assets

Table 1. (continued)

	Board size	Board	Ln(Board Size)
	Independent Director Ratio	Indep	Independent Directors / Board Size
	Top 10 Shareholding Ratio	Top10	Shareholding Ratio of Top 10 Shareholders
control variables	Balance of Ownership Structure	Balance	Shareholding Balance Index
	Company Age	FirmAge	Ln(Firm Age)
	Years since listing	ListAge	Ln(Listing Age)

Based on previous studies on enterprise digital transformation and ESG information disclosure, the control variables in this paper are selected from three dimensions: corporate financial attributes, corporate governance attributes, as well as the business life cycle, to lessen the issue of distortions brought on by the research findings' absence of factors. Table 1 shows the variables and the definitions that go with them.

3.2. Sample selection and data sources

This research made use of data from all listed firms in China's A-share market from 2015 to 2024. From the CSMAR database and the Huazheng ESG Rating database. Screening was done as follows. Financial companies - banks, insurance companies, and securities companies - were excluded. ST and *ST companies were also removed, and so were missing observations. Values at the 1st and 99th percentiles of the continuous variables were removed to minimize the effect of outliers. For the final result, this paper uses 21, 878 annual observations of companies.

3.3. Model specification

The stepwise regression approach may have biases when selecting the mediation model, according to the study material of this work and the recommendation in [8]. Therefore, a more robust testing method is adopted to ensure the reliability of causal inference. The following is how the empirical analysis model is put together:

Model 1: Benchmark Regression Model:

$$\begin{aligned}
 ESG_{i,t} = & a_0 + a_1 Digital_{i,t} + a_2 Size_{i,t} + a_3 Lev_{i,t} + a_4 ROE_{i,t} + a_5 Growth_{i,t} \\
 & + a_6 NetOFC_{i,t} + a_7 Board_{i,t} + a_8 Indep_{i,t} + a_9 Top10_{i,t} + a_{10} Balance_{i,t} \\
 & + a_{11} FirmAge_{i,t} + a_{12} LisAge_{i,t} + \lambda_i + year_t + \varepsilon_{i,t}
 \end{aligned} \tag{1}$$

In the formula, i, t refer to firm (i) in year (t), a_0 denotes the intercept, $a_1 - a_{12}$ are the variable coefficients, λ_i captures firm-specific fixed effects, $year_t$ captures year fixed effects, and $\varepsilon_{i,t}$ represents the random error term.

Model 2: Mediation Effect Model

$$Analyst_{i,t} = a_0 + a_1 Digital_{i,t} + a_2 Size_{i,t} + a_3 Lev_{i,t} + a_4 ROE_{i,t} + a_5 Growth_{i,t} \tag{2}$$

$$+a_6NetOFC_{i,t} + a_7Board_{i,t} + a_8Indep_{i,t} + a_9Top10_{i,t} + a_{10}Balance_{i,t} \\ +a_{11}FirmAge_{i,t} + a_{12}LisAge_{i,t} + \lambda_i + year_t + \varepsilon_{i,t}$$

Model 3: Moderating Effect Model

$$ESG_{i,t} = a_0 + a_1Digital_{i,t} + a_2Analyst_{i,t} + a_3Size_{i,t} + a_4Lev_{i,t} + a_5ROE_{i,t} \quad (3) \\ +a_6Growth_{i,t} + a_7NetOFC_{i,t} + a_8Board_{i,t} + a_9Indep_{i,t} + a_{10}Top10_{i,t} \\ +a_{11}Balance_{i,t} + a_{12}FirmAge_{i,t} + a_{13}LisAge_{i,t} + \lambda_i + year_t + \varepsilon_{i,t}$$

4. Results and discussion

4.1. Analysis of descriptive statistics

According to the factors chosen for this study. Descriptive statistical analysis was performed for each variable [6.1], Table 2 displays the outcomes.

Table 2. Analysis of descriptive statistics

VarName	Obs	Mean	SD	Min	Max
ESG_score	21878	4.343	1.094	1.000	9.000
Digital	21878	0.904	0.564	0.000	1.849
Analyst_In	21878	1.956	0.896	0.693	3.850
Market	21878	10.479	1.722	5.320	13.867
ROE	21878	0.047	0.056	-0.174	0.209
Size	21878	22.612	1.317	20.331	26.610
Lev	21878	0.410	0.194	0.059	0.857
NetOCF	21878	1.22e+09	3.63e+09	-2.02e+09	2.67e+10
Growth	21878	0.173	0.359	-0.479	2.079
Board	21878	2.227	0.174	1.792	2.708
Indep	21878	0.378	0.053	0.333	0.571
Top10	21878	0.602	0.147	0.259	0.914
Banlance	21878	1.022	0.798	0.067	3.979
ListAge	21878	2.056	0.912	0.000	3.401
FirmAge	21878	2.998	0.302	2.197	3.611

The ESG information disclosure quality score for the sample businesses has an average of 4.343 and a standard deviation of 1.094, with a range of 1 to 9. This shows that the quality of ESG disclosure varies significantly among different companies; they are not all the same. The average level of digitalization across businesses is 0.904, with a standard deviation of 0.564 and a range of 0 to 1.849. This indicates that the sample firms' levels of digital transformation range significantly from one another. This is crucial for later analysis of whether differences in digitalization levels affect the quality of ESG disclosure.

With a standard deviation of 0.896 and a mean of 1.956 for analyst attention, it is clear that various businesses in the capital market receive noticeably varying amounts of attention. With an

average marketization level (Market) of 10.479 and a standard deviation of 1.722, the sample firms' regional institutional environments varied significantly. Whether these differences play a moderating role will be discussed later. Control factors are the average business size of 22.612, the average debt-to-equity ratio of 0.410, and the average return on equity of 0.047. Overall, these variables show moderate variation. Other firm characteristics, such as Growth, NetOCF, board size, Indep, and Top10, also exhibit reasonable levels of dispersion; equity stake, company age, and years since listing (ListAge) all showed some degree of variation. This means that the sample companies differ in characteristics such as financial status, governance structure, and stage of development, which just meets the requirement of sample diversity for empirical research.

4.2. Correlation analysis

Based on the variables chosen for this work, correlation analysis was performed; the findings are displayed in Table 3.

Table 3. Correlation analysis

Variable Pair	Correlation
Digital – ESG	0.105***
Digital – Analyst	0.092***
Analyst – ESG	0.207***
Digital – Market	0.186***
Market – ESG	0.112***
Max Correlation	0.596

The findings provide preliminary support for H1 by demonstrating a favorable correlation between digital and ESG disclosure quality ($r = 0.105$, $p < 0.01$). Analyst attention has a favorable relationship with ESG disclosure quality ($r = 0.207$, $p < 0.01$) and digital disclosure quality ($r = 0.092$, $p < 0.01$), providing preliminary evidence for its possible mediation function. Furthermore, the quality of ESG and digital disclosure is positively correlated with the market, suggesting a possible moderating effect. Serious multicollinearity is unlikely because the maximum correlation coefficient among the explanatory variables is 0.596, below the generally recognized threshold of 0.8.

4.3. Multicollinearity test

This study builds a regression model to conduct empirical analysis. A test on the multicollinearity between the variables before starting the regression analysis. If there's a serious multicollinearity problem among variables, it directly affects the reliability of regression findings and might give false results. Consequently, multicollinearity is tested using the variance inflation factor (VIF).

All VIF values stay below 5. This shows multicollinearity isn't a big problem in this study, and it also confirms the estimate results are valid and the model is well - specified.

There's likely no obvious linear correlation between the explanatory and control variables picked in this paper. Multicollinearity won't greatly influence subsequent regression results, and this provides a reliable statistical basis for the benchmark regression analysis.

4.4. Model validation

To determine the best model specification, ran the F-test, the LM test, and the Hausman test. Therefore, the fixed-effects model is supported by the results.

At the 1% level, both the F-test and the LM test are significant. This demonstrates that the fixed-effects and random-effects models outperform the pooled model of OLS. The fixed-effects model is supported by the Hausman test, which rejects the null hypothesis.

The fixed effects model is superior to the random effects model when the Hausman test results show a p-value of 0. There are 0000 and the statistical value which amounts to 157. Since the value is 48, the random effects model's null hypothesis must be rejected. This study ultimately selects the fixed-effects model for additional regression analysis based on the previously indicated test findings.

4.5. Benchmark regression

Table 4 presents the estimation results of the benchmark regression model.

Table 4. Benchmark regression

Variables	(1)	(2)	(3)
Digital	0.0769*** (3.43)	0.0672*** (3.03)	0.0785*** (3.54)
Controls	No	Partial	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	21878	21878	21878
Adj.R ²	0.388	0.404	0.408

t statistics in parentheses

* p < 0.1, ** p < 0.05, *** p < 0.01

Notes: (1) Unless otherwise stated, t-statistics are reported in parentheses.

*, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

(2) The analysis process included control variables, but due to limited skewness, they are not included in the table. The same applies to the tables below.

Model (1) only includes enterprise digital transformation; Model (2) adds financial characteristic variables to further control; Model (3) adds corporate governance and life-cycle controls and adjusts for industry effects. All the significantly positive Digital coefficients in the models indicate that digitalisation enhances ESG disclosure quality and revelation of information. The Digital coefficient in Model (3) is 0.0785 (p < 0.01), and thus hypothesis H1 is confirmed. This outcome is consistent with the information asymmetry theory and resource allocation: digitalisation reduces information asymmetry by strengthening Information gathering and internal control; thus, the accuracy and timeliness of ESG information improve, and optimised resource allocation and reduced financing constraints support the implementation of ESG activities. Therefore, this result is in line with previous research. Among the control variables, enterprise size, operating cash flow, board size, proportion of independent directors and enterprise age all have a positive correlation with ESG quality, but the debt-to-equity ratio has a negative correlation. Digitalisation can help boost the

efficiency of the company and strengthen its ESG system. The first regression results served as the basis for the subsequent mechanism tests and heterogeneity analyses.

4.6. Robustness test

Two robustness tests were carried out in this work to guarantee the credibility of the regression estimates: the sample set and the estimation technique. The above tests are for adjusting standard errors, excluding samples from exceptional years, and modifying the sample period. The robustness test yielded the following results: Table 5.

Besides the above-mentioned results, various other experiments were carried out in order to verify the above results. This paper first tackled the issue of firm-level heteroscedasticity by computing the cluster standard errors. The findings demonstrate the continued positive significance of the digital transformation coefficient (0.0707, $p < 0.01$). Secondly, the 2020 sample was not included to avoid the potential effects of the COVID-19 pandemic and the coefficient remained significantly positive (0.120, $p < 0.01$). Thirdly, various sample periods were selected, but the type of results remained the same. Overall, the beneficial effect of digitalisation on the quality of disclosure of ESG is fairly stable across all models and sample sets, lending credence to Hypothesis H1.

Table 5. Robustness test

Variables	Baseline	Clustered SE	Excluding 2020	Recent Sample
Digital	0.0785*** (3.36)	0.0707*** (3.05)	0.120*** (3.41)	0.0785*** (3.36)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	21878	19817	13459	21878
Adj.R ²	0.408	0.404	0.396	0.408

4.7. Endogeneity test

Even while earlier findings have proven that corporate digitalization can somewhat enhance the quality of ESG information disclosure, issues like reverse causality or missing factors can still exist. In this work, instrumental variable tests have somewhat mitigated the endogeneity bias issue; the outcomes are displayed in Table 6.

Table 6. Endogeneity test

Variables	Lagged Digital	Digital Finance IV	Industry Mean IV	System GMM
Digital	—	0.0530** (2.43)	0.0785*** (3.36)	-0.0290 (-0.91)
L.Digital	0.0399 (1.37)	—	—	—
L.ESG	—	—	—	0.0556*** (4.09)
Firm FE	Yes	Yes	Yes	Yes

Table 6. (continued)

Year FE	Yes	Yes	Yes	Yes
N	15714	19116	21878	16342

This paper used lagged and instrumental variable (IV) estimation because had to address endogeneity. The evolution of digital finance and industry-average digital transformation served as tools for the 2SLS regression. Its results, though statistically significant, showed the same positive relationship between the digital transformation coefficient and ESG disclosure quality as the baseline regression. The coefficient may have demonstrated how digital transformation affects ESG disclosure quality over time, even if it did not approach statistical significance.

H1 is supported by the findings, which demonstrate that digital transformation improves ESG disclosure quality and is resistant to reverse causality issues.

4.8. Mediation effect analysis

Analyst attention will be used as the mediation variable in this study to examine the fundamental reasons why the digital transformation of organizations is likely to result in a shift in the criteria for the disclosure of ESG information. As key information channels for the capital market, analysts can reduce information asymmetry and strengthen external supervision; thus, they may be responsible for the transmission of corporate digitalisation to the quality of ESG disclosure. Table 7 presents the results of the analysis.

Table 7. Mediation effect analysis

Variables	(1) Analyst Coverage	(2) ESG Disclosure
Digital	0.0296** (2.08)	0.0764*** (3.45)
Analyst_In	—	0.0816*** (7.01)
Controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
N	21,878	21,878
Adj. R ²	0.638	0.410

Digital transformation draws more analyst coverage and improves corporate information openness, according to Model (1), which shows that Digital had a substantial positive influence on Analyst ($\beta = 0.0296$, $p < 0.05$). After incorporating analyst attention into the ESG regression in Model (2), the Analyst coefficient is 0.0816 ($p < 0.01$), and the digital coefficient drops to 0.0764 from 0.0785. (still $p < 0.01$). The results point to analyst attention as an important means by which digital transformation improves ESG disclosure quality. In other words, digital transformation does a lot more than just directly contribute to upping the quality of ESG reporting. However, this indirectly tightens the requirements for the disclosure of ESG information, as it attracts more analysts and increases the pressure on financial markets from external regulatory authorities.

Therefore, research hypothesis H2 is valid. In an economic sense, digital transformation reduces the cost of analyst information acquisition and increases analyst coverage, which can make

companies face stronger reputation constraints and external supervision, thus giving companies more incentive to satisfy investors' demands and raise the standard of ESG reporting.

4.9. Moderating effect analysis

This paper aims to explore the moderating role of the institutional environment. To conduct empirical testing, create an interaction term between Market and Digital using marketization (Market) as a moderator. The relevant results are put forward in Table 8.

Table 8. Moderating effect analysis

Variables	ESG_score
Digital	-0.502*** (-4.84)
Market	-0.116*** (-5.26)
Digital $\times$ Market	0.0576*** (5.73)
Controls	Yes
Firm FE	Yes
Year FE	Yes
N	21,878
Adj. R ²	0.410

As shown in Table 8, the coefficient on the interaction term (Market $\times$ Digital) is 0.0576 ($p < 0.01$), and it can be concluded that marketization positively enhances the effect of digital transformation on ESG disclosure quality. In other words, the more the degree of marketisation, the greater the increase in ESG disclosure quality and the more thoroughly the governance and information implications of digital transformation are disclosed.

This result has a reasonable institutional reason. Areas with high levels of marketisation generally have more complete market mechanisms, legal systems and information dissemination environments; thus, these regions can convert digitalisation into better information transparency and governance abilities more efficiently, and conversely, a weak institutional environment will limit the realisation of digital advantages. Well-known places usually have stronger protection for investors, more media and other capital market restrictions, so these companies are under greater pressure to disclose information and maintain a good corporate image. Therefore, the information advantages created by digitalisation are more readily recognised by the market and can be converted into higher-quality ESG.

In summary, marketization positively moderates the effect of digitalization on the level of ESG disclosure, supporting hypothesis H3.

5. Heterogeneity analysis

5.1. Analysis of property rights heterogeneity

Enterprises of different ownership structures have different resource amounts, governance ways, and policy restrictions. As a result, their reactions to how corporate digitization affects the quality of

ESG information sharing will also differ.

This goal was to examine the impact of corporate digital transformation on the quality of ESG information disclosure. In order to perform various regressions, this study separated samples of state-owned and non-state-owned businesses based on ownership structure.

Table 9. Analysis of property rights heterogeneity

Variables	SOE	Non-SOE
Digital	0.145*** (3.70)	0.0470* (1.74)
Controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
N	6,226	15,577
Adj. R ²	0.459	0.394

Based on the above, the regression coefficients for "Digital" in the SOE sample and the non-SOE sample are as follows: 0.145 (at the 1% significance level, positive) and 0.0470 (not statistically significant at the 10% level, positive). State - owned enterprises (SOEs) benefit more from digital transformation in terms of ESG information - sharing quality, and that's obvious. Maybe SOEs generally deal with tighter policy constraints and demands for social responsibility. Since they get more attention from the government, investors, and the public, they have a stronger drive to improve ESG governance and information sharing.

At the same time, state-owned enterprises (SOEs) generally have more abundant funds, technology and digital infrastructure, so it is easier for them to use the digital advantage to improve governance efficiency. Private companies can also improve the quality of their ESG reporting through digitalisation, but due to resource constraints, limited funds for digitalisation, and high operating pressure, the positive impact is relatively small. This conclusion is in line with the findings in [12], and it can also be seen that the characteristics of property rights are an important context that affects the governance effect of digital transformation; although the conclusion in [11] suggests that private enterprises have a stronger promoting effect, from the perspective of marginal improvements. The various resources and institutional systems available to the different types of owners have likely contributed in a cumulative way to generating wide-ranging impacts of digital transformation and more abundant empirical data have been provided to study the connection between ESG governance and the digital revolution of Chinese enterprises.

5.2. Industry heterogeneity analysis

Given that various industries have varying levels of environmental protection, social responsibility, and ESG criteria. The influence of ESG-related digital transformation

disclosure quality may range among businesses due to variations in operating characteristics, environmental obligations, and legal constraints. The sample is separated into high-pollution and non-high-pollution industries according to the categorization criteria in order to investigate industry heterogeneity, and independent regressions are carried out for each group [13].

Table 10. Industry heterogeneity analysis

Variables	Group 1	Group 2
Digital	0.160*** (3.62)	0.0348 (1.35)
Controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
N	4,981	16,836
Adj.R ²	0.394	0.422

Table 10's findings demonstrate that the digital regression coefficient in high-pollution sectors is 0.160 ($p < 0.01$), but it is only 0.0348 and not significant in non-high-pollution industries. This suggests that highly polluting businesses are more favorably affected by digital transformation in terms of the quality of ESG information disclosure. The practical explanation is that enterprises in industries with high pollutant levels face more stringent environmental laws, higher social attention, and greater environmental responsibility pressure, and are therefore more motivated to use digital technology to improve environmental information management capabilities, strengthen internal control, optimize real-time environmental data monitoring and risk identification to more effectively meet the needs of regulators and stakeholders. In contrast, non-high-pollution industries have weaker environmental constraints and limited ESG disclosure pressure. Although digital transformation can improve governance and information transparency, the marginal effect is small and therefore not statistically significant. The above findings are highly consistent with the conclusions of [12], which jointly confirm that industry characteristics and environmental regulatory pressure are important boundary conditions for the governance effect of digital transformation.

6. Conclusions

A sample of Chinese listed companies is used in this paper. The effect of business digitalization on the caliber of ESG disclosures will be examined through empirical research. The mechanism of this effect, moderating effects and heterogeneity characteristics. Research has shown that the digitalisation of enterprises can enhance the quality of ESG reporting. Digital technology may show that businesses have stronger ESG governance and disclosure skills in addition to enhancing corporate information transparency and internal controls. After the tests of cluster robustness, standard error, removal of samples from special years, adjustment of sample intervals and endogeneity handling, the main conclusions are still the same. Based on the analysis above, analyst tracking is only an indirect mediator of the connection between ESG disclosure quality and company digitalization; the degree of marketisation is positively correlated with this link. Additionally, the consequences were comparatively greater on state-owned businesses and those in highly polluting industries in intermittent testing.

This study has several limitations. In the first place, digital transformation is measured based on textual information that is disclosed in annual reports. Although this allows firms to express their DSO, there might be a disconnect between the DSO and the degree of digital transformation or its impact. Further research can include other indicators like 'digital investment', 'digital patents' and 'digital talents' to create a more holistic digitalization indicator.

Second, sample is confined to Chinese A-share listed companies, so the findings of this study cannot be generalized. In the future, the analysis could be expanded to non-listed companies or other countries or regions. Besides, additional research could be conducted on other ways that digital transformation affects ESG disclosure quality such as the financing constraints, green innovation, internal control quality, and corporate reputation.

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