Original Research Article

Research on the interactive mechanism between corporate ESG performance and accounting information comparability in the context of digital transformation

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Abstract: This study takes Chinese A-share non-financial listed companies from 2010 to 2024 as a sample. In the context of digital transformation, a positive interactive cycle exists between corporate ESG performance and accounting information comparability. This effect is more pronounced in high-tech enterprises with a high degree of digitalization and low information asymmetry. Its core transmission pathways are the enhancement of information disclosure quality and corporate governance efficiency. Accordingly, it is recommended that enterprises deeply integrate these three elements, and regulatory authorities should improve relevant normative systems to facilitate high-quality and sustainable development.
Keywords: digital transformation; ESG performance; accounting information comparability; information disclosure; corporate governance

1. Introduction

In the era of the digital economy, digital transformation is profoundly impacting corporate financial management and operational models. As two core indicators of concern in capital markets, accounting information comparability and ESG performance have often been explored separately in existing research, lacking in-depth analysis of the bidirectional interactive relationship between them. Taking this as a starting point, this paper empirically examines the interactive effects and underlying mechanisms of these two factors in the context of digital transformation, aiming to provide theoretical and practical references for enterprises to achieve the synergistic enhancement of ESG and accounting information quality.

2. Theoretical analysis and research hypotheses

2.1. The positive impact of ESG performance on accounting information comparability

Improved ESG performance can enhance accounting information comparability from both information disclosure and corporate governance perspectives. From the information disclosure perspective, enterprises with high ESG performance have more standardized and complete disclosures, which can reduce the arbitrariness in accounting policy choices and enhance the standardization of information. From the corporate governance perspective, enterprises with high ESG performance have moregovernance structures, strengthening supervision, curbing earnings management behaviors, and ensuring the authenticity and consistency of information[1]. Based on this, the following hypothesis is proposed: H1: The higher a company's ESG performance, the stronger its accounting information comparability.

2.2. The positive impact of accounting information comparability on ESG performance

Enhanced accounting information comparability can promote corporate ESG performance by reducing information asymmetry and optimizing resource allocation. Higher comparability makes it easier for external stakeholders to compare corporate operating conditions, reducing information asymmetry and compelling enterprises to focus on ESG performance to gain market recognition. High comparability can improve the scientific nature of internal management decisions, helping enterprises accurately identify shortcomings and rationally allocate resources to areas such as green innovation and social responsibility. Concurrently, external supervisory pressure can also optimize governance structures. Based on this, the following hypothesis is proposed: H2: The higher a company's accounting information comparability, the better its ESG performance.

2.3. The moderating role of digital transformation

Digital transformation can strengthen the bidirectional interaction between ESG performance and accounting information comparability by enhancing information processing and transmission capabilities. Highly digitally transformed enterprises can leverage technologies like big data and blockchain to achieve efficient integration and standardization of ESG and accounting information. This not only allows the information optimization effect of ESG to be fully transmitted to the accounting process to enhance comparability but also enables high comparability to accurately capture stakeholder needs, amplifying its promotional effect on ESG performance. Conversely, enterprises with low levels of digital transformation, due to lower information processing efficiency, struggle to achieve this effective mutual empowerment. Based on this, the following hypothesis is proposed[2]: H3: Digital transformation positively moderates the bidirectional relationship between ESG performance and accounting information comparability. That is, the higher the degree of digitalization, the more significant the mutual reinforcement effect between the two.

3. Research design

3.1. Sample selection and data sources

This paper selects Chinese A-share non-financial listed companies from 2010 to 2024 as the sample. After excluding ST companies, and those with missing or abnormal data, a final sample of 4,528 companies with 42,650 firm-year observations is obtained. ESG performance data originates from the HuaZheng ESG rating. Accounting information comparability is calculated using financial data. Digital transformation data is derived from textual analysis of annual reports. Other financial and governance data come from the CSMAR and Wind databases. To mitigate the influence of outliers, all continuous variables are winsorized at the 1% and 99% levels.

3.2. Variable definitions

(1) Dependent and Independent Variables:

Accounting Information Comparability (Comp): Calculated following the methodology of De Franco et al., using industry-year regression models to derive firm-specific accounting information comparability metrics. A larger value indicates stronger comparability[3].

ESG Performance (Esg): Measured using the HuaZheng ESG rating. Ratings from C to AAA are assigned values 1 to 9, where a larger value indicates better ESG performance.

(2) Moderating Variable:

Digital Transformation (Digital): Measured using textual analysis. The frequency of keywords related to digitalization, big data, cloud computing, blockchain, etc., in listed companies' annual reports is counted, and the natural logarithm of this frequency is taken as a proxy variable for the degree of digital transformation.

(3) Control Variables:

Referring to existing research, control variables include firm size (Size), leverage (Lev), return on total assets (Roa), firm age (Age), board size (Board), proportion of independent directors (Indep), CEO duality (Dual), and the shareholding ratio of the largest shareholder (First). Industry fixed effects (Ind) and year fixed effects (Year) are also controlled. Detailed definitions of each variable are provided in **Table 1**.

Table 1. Definitions of main variables.

Variable Type	Variable Name	Symbol	Definition
Dependent Variable	Accounting Info Comparability	Comp	Metric calculated based on the method of De Franco et al.
Dependent Variable	ESG Performance	Esg	HuaZheng ESG Rating
Independent Variable	ESG Performance	Esg	Same as above
Independent Variable	Accounting Info Comparability	Comp	Same as above
Moderating Variable	Digital Transformation	Digital	Natural logarithm of the frequency of digitalization-related keywords in annual reports.
Control Variable	Firm Size	Size	Natural logarithm of total assets.
Control Variable	Leverage	Lev	Total liabilities / Total assets.
Control Variable	Return on Assets	Roa	Net income / Average total assets.
Control Variable	Firm Age	Age	Natural logarithm of the number of years since establishment.

Continued Table 1

Variable Type	Variable Name	Symbol	Definition
Control Variable	Board Size	Board	Natural logarithm of the number of board members.
Control Variable	Independent Directors	Indep	Number of independent directors / Total board members.
Control Variable	CEO Duality	Dual	Dummy variable equals 1 if the chairman and CEO are the same person, 0 otherwise.
Control Variable	Largest Shareholder	First	Shareholding ratio of the largest shareholder.

3.3. Model specification

To test the impact of ESG performance on accounting information comparability, Model (1) is constructed:

$$Comp_{i,t} = \alpha_0 + \alpha_1 Esg_{i,t} + \sum \alpha Control_{i,t} + \sum Ind + \sum Year + \varepsilon_{i,t}$$

To test the impact of accounting information comparability on ESG performance, Model (2) is constructed:

$$Esg_{i,t} = \beta_0 + \beta_1 Comp_{i,t} + \sum \beta Control_{i,t} + \sum Ind + \sum Year + \mu_{i,t}$$

To test the moderating effect of digital transformation, the interaction term Esg × DigitalEsg × Digital is added to Model (1), constructing Model (3):

$$Comp_{i,t} = \gamma_0 + \gamma_1 Esg_{i,t} + \gamma_2 Esg_{i,t} \times Digital_{i,t} + \gamma_3 Digital_{i,t} + \sum \gamma Control_{i,t} + \sum Ind + \sum Year + \vartheta_{i,t}$$

Among which, i enterprise t indicate the year, ε, μ, ϑ, For the random disturbance term, Control "Set of control variables".

4. Empirical analysis results

4.1. Descriptive statistics

Descriptive statistics for the main variables show that the mean value of accounting information comparability (Comp) is 0.52 with a standard deviation of 0.31, indicating considerable variation among sample firms. The mean ESG performance (Esg) is 4.26, with a median of 4.00 and a maximum of 6.00, suggesting that most enterprises have significant room for improvement. The mean value of digital transformation (Digital) is 1.85, with a standard deviation of 5.22, reflecting substantial differences in the digital transformation process across firms. The distributions of control variables, such as firm size (Size) and leverage (Lev), are generally consistent with existing research, confirming the representativeness of the sample[4].

4.2. Benchmark regression analysis

The benchmark regression results show that both ESG performance and accounting information comparability are significantly positively correlated at the 1% level. This indicates a significant positive interactive relationship between the two, enabling mutual empowerment and synergistic improvement, thus supporting H1 and H2.

4.3. Moderation effect test

The moderation effect test reveals that digital transformation significantly and positively moderates the bidirectional interactive relationship between ESG performance and accounting information comparability. That is, the higher the degree of enterprise digitalization, the more significant the mutual reinforcement effect between the two, supporting H3.

4.4. Robustness tests

To verify the robustness of the conclusions, several tests were conducted: Replacing core variables with alternative indicators and re-running the regressions yielded unchanged conclusions. Re-estimating using fixed-effects, random-effects, and Tobit models all supported the original hypotheses. Finally, employing lagged independent variables and industry means of ESG performance and accounting information comparability as instrumental variables for 2SLS regression effectively mitigated endogeneity concerns, and the core conclusions remained robust[5].

4.5. Heterogeneity analysis

For heterogeneity testing, the sample was grouped based on the number of analysts following. The bidirectional interactive effect between ESG performance and accounting information comparability was found to be more pronounced in the group with low information asymmetry, attributable to their higher information transmission efficiency. Further grouping by enterprise type showed the effect to be more significant in high-tech enterprises, likely because their stronger foundation in digital transformation makes it easier to achieve the synergistic improvement of both factors.

5. Mechanism analysis

To explore the underlying mechanisms of the bidirectional interaction between ESG performance and accounting information comparability, this paper uses information disclosure quality and corporate governance efficiency as mediating variables. The results show that both mediators play significant roles in the two influence pathways. This indicates that ESG performance and accounting information comparability achieve mutual empowerment by enhancing information disclosure quality and corporate governance efficiency, which are the key transmission mechanisms for their interaction.

6. Conclusion

This study, based on a sample of Chinese A-share non-financial listed companies from 2010 to 2024, empirically finds a significant positive interaction between ESG performance and accounting information comparability. Digital transformation positively moderates this relationship. The effect is more significant in enterprises with low information asymmetry and in high-tech enterprises. Information disclosure quality and corporate governance efficiency are identified as key transmission pathways. It is recommended to deeply integrate digital transformation, ESG, and accounting information quality by building integrated platforms, unifying disclosure standards, and improving value assessment systems to reduce information asymmetry and provide reliable decision-making references for stakeholders.

About the author

Liying Zhang (2002.06-), female, Han nationality, from Harbin, Heilongjiang Province, holds a master's degree, with research interests in ESG accounting, corporate governance, and business analysis.

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