How Corporate ESG Performance Drives Green Transformation: Empirical Evidence from China's A-Share Listed Firms

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Abstract. Sustainable development has emerged as a worldwide imperative and a central expression of China's dual-carbon objectives. With escalating regulatory expectations concerning ESG disclosure by A-share listed firms, the influence of corporate ESG performance on green transition has become a subject meriting rigorous scholarly examination. This study investigates the impact of ESG performance on corporate green transformation—and the mechanisms driving this relationship—by applying a two-way fixed effects model to a panel of Chinese A-share listed companies spanning 2015–2025. The results yield three key conclusions. First, ESG performance exerts a significantly positive effect on green transformation. Second, mechanism analysis reveals that alleviating financing constraints serves as an important transmission channel through which ESG performance facilitates green transformation. This study contributes to the scholarly discourse on factors influencing corporate green transformation and underscores how alleviating financing constraints facilitates the linkage between ESG performance and green transformation.

Keywords: ESG; Corporate Green Transformation; Financing Constraints

1 Introduction

Against the backdrop of intensifying global climate governance and worsening ecological degradation, governments worldwide have increasingly incorporated environmental principles into policy formulation. In September 2020, China officially declared its commitment to cap carbon emissions prior to 2030 and attain carbon neutrality by 2060, with the objective of advancing a green economic transition and fostering high-quality development. Building on this, the 14th Five-Year Plan (2021–2025) has strengthened the "dual-carbon" targets, setting forth a clear strategy for achieving carbon peaking through the cultivation of new quality productive forces and mandating a holistic green transformation across both the economy and society. This offers high-level policy backing for enterprises' transition toward environmental sustainability and the advancement of low-carbon industrial sectors.

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Corporate green transformation—understood as a firm's capacity to pursue sustainable development, sustain green innovation, and facilitate iterative upgrading—has become a pivotal determinant of long-term survival and core competitiveness. Concurrently, ESG performance—encompassing Environmental, Social, and Governance criteria—broadens and deepens the principles underlying green and responsible investment. It has also become a globally recognized benchmark for evaluating corporate sustainability [4]. ESG has evolved from a mere assessment framework into a critical pillar for achieving the "dual-carbon" goals and promoting high-quality economic growth. China is now at a crucial stage of transforming its growth model and fostering green industries, and it urgently needs to address pressing challenges such as resource-intensive inputs and excessive consumption [9]. Given the strong conceptual alignment between ESG performance and green transformation, exploring their intrinsic linkage has increasingly become a focal point of both academic inquiry and corporate practice.

This paper explores the impact of ESG on corporate green transformation, and its marginal contributions are mainly twofold. First, this study expands the research perspective on the factors influencing corporate green transformation. Although prior research has largely examined this issue through the lens of national-level green policy frameworks[10], marketization degree [1], and internal firm motivations [5], this paper incorporates ESG performance into the analytical framework, thereby elucidating the pathways to advance corporate green transformation under the principles of sustainable development. Second, it elucidates how ESG performance influences corporate green transformation—specifically by empirically examining financing constraints as a mediating factor, thereby addressing a lacuna in the current literature on these causal pathways.

2 Research Hypotheses

According to signaling theory, when information asymmetry exists, firms of superior quality voluntarily convey credible signals to market participants. Good ESG performance conveys a positive signal that the firm values sustainable development and environmental protection, thereby helping it secure external resources [3]. Sufficient capital and market resources can alleviate investment pressures, thereby facilitating corporate green transformation. According to stakeholder theory, organizational growth is contingent upon stakeholder reactions. When a firm's production and operations cause severe environmental pollution, ESG performance can promptly reflect the firm's risks and transmit this information to stakeholders. To safeguard their own interests, stakeholders may either directly exert supervisory and disciplinary mechanisms or generate strong public opinion pressure, thereby compelling the firm to pursue green transformation.

H1: ESG performance has a significantly positive promoting effect on corporate green transformation.

3 Research Design

3.1 Sample Selection and Data Sources

This study employs a sample of Chinese A-share listed firms spanning the period 2015–2025. The underlying data are drawn principally from three sources: the Wind database, the China Research Data Services Platform (CNRDS), and the CSMAR database. To safeguard the accuracy and reliability of the findings, the sample underwent stringent screening and preprocessing procedures: (1) firms classified as ST or *ST were omitted; (2) observations exhibiting substantial missingness in critical variables were discarded; (3) entities operating in the financial sector were excluded; and (4) all continuous variables were winsorized at the 1st and 99th percentiles to attenuate the impact of extreme outliers.

3.2 Variable Definitions and Measurement

3.2.1. Dependent Variable.

Following the approach of Xiang Hailing et al.[7] employs the natural logarithm of the aggregate frequency of all green transformation–related keywords appearing in the annual reports of listed firms as the dependent variable.

3.2.2. Independent Variable.

Following Wang Linlin et al.[6], this paper adopts the ESG ratings provided by Huazheng (Sino-Securities) as the independent variable. The ratings are categorized into nine levels—spanning from C to AAA—and assigned numerical values from 1 to 9, where higher numbers reflect stronger ESG performance.

3.2.3. Control Variables.

Drawing on Li Jinglin et al.[3] examining the drivers of corporate green transformation, this study incorporates six control variables: firm size (Size), leverage ratio (LEV), total asset turnover (ATO), return on total assets (ROA), cash ratio (Cash), and a binary indicator for loss occurrence (Loss).

3.2.4.Mediating Variable.

The SA financing constraint index, introduced by Hadlock and Pierce, aims to mitigate the estimation biases characteristic of conventional financing constraint measures—including the KZ and WW indices—by avoiding endogenous financial variables such as cash flow and leverage. This index constructs a financing constraint measure using only two strongly exogenous variables: firm size and firm age.

3.3 Model Specification

This study employs a panel data regression framework to examine how firms' environmental, social, and governance (ESG) performance influences their green transformation. The model is specified as follows:

$$GT_{it} = \alpha_0 + \alpha_1 ESG_{it} + Controls_{it} + Year_t + Ind_i + \varepsilon_{it} \quad (1)$$

where GT_{it} signifies the extent of green transformation undertaken by firm i in year t, and ESG_{it} reflects the Huazheng ESG performance score of firm i in year t. The vector of control variables, $Controls_{it}$, encompasses firm-level attributes: natural logarithm of total assets,$Controls_{it}$ debt-to-assets ratio (LEV_{it}), total asset turnover (ATO_{it}), return on assets (ROA_{it}), cash-to-current-liabilities ratio ($Cash_{it}$), and an indicator variable for negative net income ($Loss_{it}$). $Year_t$ denotes year fixed effects, Ind_i denotes individual fixed effects, and ε_{it} is the random error term. The intercept term is denoted byα_0, while α_1 represents the coefficient quantifying the impact of ESG_{it} on GT_{it}. Consistent with our research hypothesis,α_1 is anticipated to be statistically significant and positive.

4 Empirical Analysis

4.1 Descriptive Statistics

We begin by performing descriptive statistical analyses to assess the fundamental properties and distributional patterns of the variables. These analyses reveal substantial variation across variables in terms of both central tendency and variability. Specifically, the mean value of GT is 0.6%, indicating that the overall level of green transformation among sample firms is relatively low. The standard deviation of GT is 0.003, suggesting that the cross-firm variation in the green transformation indicator is small. The mean ESG score is 4.564, implying that the sample firms exhibit a moderate level of overall ESG performance. The mean Size is 23.267, indicating that the asset size of the sample firms is within a normal range. The mean leverage ratio (Lev) is 0.461, suggesting a moderate debt level. The average return on assets stands at 0.04, indicating a moderate degree of profitability among the firms in the sample. The means and extreme values of the other control variables, including ATO, Cash, and Loss, all fall within reasonable ranges.

4.2 Correlation Analysis

Subsequently, we perform a correlation analysis to initially examine the interrelationships among the variables and assess possible multicollinearity. Corporate green transformation (measured by GT) is significantly and positively correlated with ESG, providing initial evidence that better ESG performance is associated with a higher level of green transformation. Firm size (Size) and the leverage ratio (Lev) exhibit significant positive associations with GT, whereas cash holdings (Cash) show a significant negative association with GT. Since the absolute values of all correlation coefficients

are below 0.7, the likelihood of multicollinearity arising from simultaneously including these variables in the model is low.

4.3 Multicollinearity Test

To assess potential multicollinearity among the independent variables, we computed the variance inflation factor (VIF) for each. All VIF values fall between 1.077 and 1.848—substantially lower than the conventional threshold of 10—with a mean VIF of 1.452. Corresponding tolerance values (1/VIF) all surpass 0.5, confirming the absence of serious multicollinearity in the model. Consequently, the regression coefficient estimates exhibit stability and reliability, facilitating additional regression analyses.

4.4 Benchmark Regression

To test the research hypothesis and examine the direct impact of ESG on corporate green transformation (GT), this study employs a two-way fixed effects model for empirical analysis. Table 1 presents the benchmark regression results. Column (1) includes only the core explanatory variable, ESG, to examine the baseline effect of ESG on green transformation, while Column (2) incorporates all control variables for the full specification.

The findings reveal a positive and statistically significant coefficient for ESG in both specifications, suggesting that enhanced ESG performance facilitates corporate green transformation (GT). The Hausman test validates the use of the fixed-effects estimator. Year- and entity-level fixed effects are jointly incorporated in the model. The dataset consists of 11,212 observations, and the coefficient of determination ranges between 0.729 and 0.731, reflecting strong aggregate explanatory capacity of the model.

Table 1. Benchmark Regression Results

VARIABLES	GT	GT
	(1)	(2)
ESG	0.00017***	0.00013***
	(6.380)	(4.939)
Controls	Yes	Yes
Hausman Test	267.37***	1347.19***
Observations	11,212	11,212
R-squared	0.729	0.731
yearfix	YES	YES
idfix	YES	YES

4.5 Mechanism Test

To investigate the mechanism by which ESG performance influences corporate green transformation, this study employs Jiang Ting's two-step approach[2] to assess whether financing constraints mediate this relationship. Table 2 reports the detailed empirical results. Across model specifications—both with and without control variables—the

estimated coefficients for the key explanatory variable, ESG, are statistically significant and negative at the 1% level, suggesting that superior ESG performance is associated with a substantial reduction in corporate financing constraints.

Furthermore, alleviating financing constraints can effectively promote corporate green transformation. Theoretically, green transformation encompasses research and development of clean technologies, modernization of environmental infrastructure, and the reconfiguration of production processes—activities marked by substantial initial capital outlays, extended return horizons, and significant uncertainty, thereby rendering firms highly reliant on external sources of finance. The alleviation of financing constraints directly reduces the cost and difficulty of obtaining external funds, expands the sources of capital available for green investment, and enables firms to undertake green projects with high sunk costs in the early stages [8].

Table 2. Mechanism Test

VARIABLES	SA Index	
	(1)	(2)
ESG	-0.00869***	-0.00323***
	(-15.832)	(-6.551)
Controls	Yes	Yes
Observations	11,194	11,194
R-squared	0.987	0.990
yearfix	YES	YES
idfix	YES	YES

5 Conclusion and Policy Implications

Drawing on empirical evidence from Chinese A-share listed firms between 2015 and 2025, this study investigates how ESG performance influences corporate green transformation and explores the associated pathways. The results reveal: (1) ESG performance has a statistically significant positive impact on green transformation, suggesting that superior ESG performance serves as an effective driver of corporate green transformation. Second, financing constraints (SA) play a significant mediating role between ESG performance and green transformation. Strong ESG performance mitigates financing constraints and enhances access to capital, thus indirectly supporting corporate green transformation. Moreover, the comprehensive model validation confirms the robustness of the findings, affirming both the appropriateness of the two-way fixed effects specification and the dependability of the estimates.

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