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Facades on Firm Value**

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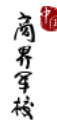
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*JEL Classification:* G34, G38, M14

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# Greenwashing's Dilemma: Dynamics of ESG Facades on Firm Value

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## Abstract

ESG engagement allows firms to achieve sustainable development, but greenwashing through selective disclosure creates a "bad money drives out good" dilemma in ESG dissemination. This paper demonstrates that ESG greenwashing exerts a dual effect on firm value among Chinese A-share listed firms, with a short-term positive impact followed by a long-term adverse effect. Using dynamic panel models, we find a positive effect of greenwashing on firm value by alleviating firms' financing constraints. However, the relation reverses in the subsequent two years, which is due to weakened innovation capacity via reduced R&D and reputation discounts. These findings enrich signaling and stakeholder theories with time-varying insights. It offers practical guidance for identifying greenwashing, enhancing regulatory frameworks, and promoting true ESG practices.

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## 1. Introduction

In an era marked by escalating global environmental challenges and the pursuit of sustainable development, China's advocacy for "green water and green mountains are golden mountains" since 2005 has underscored the integration of ecological principles into economic growth, aligning with international efforts such as the United Nations' Millennium Development Goals and the 2030 Agenda for Sustainable Development, which encompass 17 Sustainable Development Goals (SDGs) applicable to all nations. This paradigm shift positions corporations as pivotal actors in balancing profit imperatives with broader societal and environmental responsibilities, encapsulated in Environmental, Social, and Governance (ESG) frameworks. ESG practices serve as a critical conduit for firms to contribute to decarbonization and sustainable transitions, reinforced by regulatory advancements like the China Securities Regulatory Commission's (CSRC) 2022 amendments mandating comprehensive ESG reporting for listed companies, thereby enhancing transparency and directing capital toward sustainability-aligned entities.

The importance of ESG lies in its potential to foster long-term corporate resilience and stakeholder trust, yet it is complicated by the prevalence of "greenwashing"—symbolic ESG disclosures that exaggerate environmental commitments without substantive actions, often through selective reporting or data embellishment (Huang Shizhong, 2022). This phenomenon not only erodes information authenticity and misleads stakeholders but also perpetuates a "bad money drives out good" dilemma in ESG disclosures, undermining market integrity and sustainable progress. Motivated by China's nascent ESG institutionalization, characterized by voluntary standards, inconsistent ratings, and limited third-party verification, this study investigates the interplay between ESG greenwashing and corporate financial outcomes, driven by the need to address how such behaviors affect firm valuation amid information asymmetries, as explained by signaling and stakeholder theories (Quan Xiaofeng & Xiao Hongjun, 2016; Ferreira et al., 2023).

Despite growing scholarship on ESG, significant gaps persist: while studies highlight positive ESG impacts on stakeholder perceptions, financing constraints alleviation, and performance (Gu Leilei et al., 2020), and identify greenwashing causes (e.g., executive team instability or weak media scrutiny; Zhou Yan et al., 2024; Li Xiuxiu, 2024) and static negative consequences (Zou Yanfang et al., 2024), few examine dynamic temporal effects, transmission mechanisms, or moderating factors from a longitudinal perspective. This research addresses these voids by posing key questions: What are the short- and long-term dynamic impacts of ESG greenwashing on corporate market performance? Through what mechanisms do these effects transmit, and how are they moderated by internal and external

factors?

Employing unbalanced panel data from Chinese A-share listed companies (2009–2023) via two-way fixed effects models and mediating/moderating analyses, our findings reveal a dual effect: greenwashing boosts current-period market performance by alleviating financing constraints but inhibits it in subsequent lags through weakened innovation capacity (via reduced R&D personnel proportions) and reputation discounts. Institutional investor ownership amplifies short-term valuation bubbles, while external regulatory pressure exacerbates long-term penalties; heterogeneity analysis shows stronger short-term premiums for non-state-owned enterprises, with no significant ownership differences in long-term inhibition.

This study contributes theoretically by constructing a dynamic framework for greenwashing analysis, enriching stakeholder and signaling theories with time-varying insights and internal innovation channels, while practically offering tools for identifying pseudo-ESG behaviors, guiding corporate standardization, and informing regulatory enhancements like hierarchical disclosures and investor governance upgrades to shift ESG from signal games to value co-creation. Methodologically, it innovates by applying instrumental variables to dynamic contexts and delineating lagged mechanisms.

The paper is organized as follows. Chapter 2 reviews the ESG greenwashing literature and develops the theoretical framework and hypotheses. Chapter 3 details the empirical design. Chapter 4 presents the results, including regression analyses and an examination of underlying mechanisms. Chapter 5 conducts robustness checks. Chapter 6 discusses the study's limitations. Finally, Chapter 7 concludes the paper.

## 2. Literature Review and Hypothesis Development

### 2.1 Non-linear Effect on Tobin's Q

The corporate finance literature has extensively investigated non-linear relationships between various firm attributes and Tobin's Q, a widely used proxy for firm value, highlighting how optimal levels of governance, ownership, and sustainability practices can enhance performance while excesses or deficiencies lead to diminishing returns. Early seminal works documented a hump-shaped (concave) pattern between managerial ownership and Tobin's Q, where moderate ownership aligns incentives but higher levels foster entrenchment (Morck et al., 1988; McConnell and Servaes, 1990). Building on this, Fabisik et al. (2021) challenge the universality of this view through an analysis of over 50,000 firm-years from 1988 to 2015, uncovering a systematically negative relation in

expansive samples inclusive of smaller firms, attributable to stock illiquidity frictions and past performance effects; better-performing firms enjoy greater liquidity for post-IPO share adjustments and elevated Tobin's Q, whereas illiquid, underperforming firms retain elevated ownership, reflecting historical rather than prospective value, thus emphasizing the role of liquidity constraints in refining ownership-value theories.

This context-dependency extends to governance interactions, as Kim and Lu (2011) illustrate that the ownership-Tobin's Q nexus hinges on external governance (EG) strength, manifesting as hump-shaped under weak EG—where low ownership curbs agency issues via incentives, but high ownership entrenches CEOs and stifles risk-taking—yet flattening to insignificance under robust EG, which acts as a substitute for ownership in mitigating managerial slack. Their robustness to endogeneity and channel analysis via R&D investments underscores the interplay of incentive and risk-aversion mechanisms. Analogous non-linear dynamics appear in related domains like corporate fraud during initial public offerings (IPOs), where Wang et al. (2010) reveal a hump-shaped fraud propensity tied to investor optimism about industry prospects in 1995–2005 IPO samples: fraud escalates with moderate optimism but wanes at extremes, mediated by investor monitoring (amplified in VC-backed firms) and short-term pay structures, with underwriters focusing on reputational safeguards, aligning with models like Povel, Singh, and Winton (2007) and calling for boom-time regulatory vigilance to counter market externalities.

Shifting to sustainability dimensions, mixed evidence on corporate social responsibility (CSR) and firm performance suggests non-linear pathways beyond linear effects, with Sun et al. (2019) validating an inverted U-shaped CSR-shareholder value link: initial engagements boost Tobin's Q through stakeholder gains, but overcommitment erodes value via resource depletion, moderated by marketing capabilities that sustain positives at high levels per resource-based and dynamic capabilities theories. Similarly, in environmental performance (EP), Ghosh et al. (2023) integrate resource-based view and "too little of a good thing" frameworks to uncover a U-shaped EP-Tobin's Q relation in Indian non-financial firms (2010–2020), where low EP (via disclosure scores) initially hampers value until a 36-point threshold, yielding subsequent positives from resource buildup, with firm size and board factors as enhancers, urging strategic patience in EP investments. Complementing this, Laplume et al. (2021) reconceptualize stakeholder management performance (SMP) variation as balance/imbalance in a decade-long sample of over 18,000 observations, finding an inverted U-shaped tie to Tobin's Q: moderate variation maximizes value by exploiting mild imbalances, while extremes incur risks, advancing instrumental stakeholder theory and guiding managerial allocations toward

bounded flexibility.

Collectively, these studies illuminate the prevalence of non-linear, often curvilinear, associations with Tobin's Q, driven by contingencies like governance, market conditions, and resource moderators, underscoring the need for nuanced theoretical models that account for thresholds, frictions, and dynamic interactions in firm valuation.

## 2.2 Greenwashing and Corporate Behavior

Our research is intellectually connected to studies examining the relationship between ESG practices and corporate performance. In particular, we follow the sustainable development framework of Li Jinglin et al. (2021) and define ESG maturity as the internalization of externalities through environmental, social, and governance dimensions that enhance operational resilience and stakeholder synergies. Like Li et al., we take a triple bottom line perspective to measure ESG impacts on financial stability and nonmarket advantages, identifying positive associations mediated by innovation capacity, though we also incorporate moderating factors such as media scrutiny and financial constraints as in Yuan Yehu et al. (2021) and Chen Lingfang et al. (2022). While these studies examine supportive ESG effects, we contrast them with evidence of inverse or nonlinear relations, including short-term value erosion from Garcia et al. (2020), detrimental impacts in specific sectors from Gutierrez-Ponce and Wibowo (2024), inverted U-curves from Nollet et al. (2016), and inconclusive nexuses from Baek and Lee (2024) or Whelan (2021)'s meta-analysis.

Our work is directly related to a growing literature on inconsistencies in ESG research. That divergent findings arise from heterogeneous standards, disclosure guidelines, rating criteria, and performance metrics (Yu et al., 2020; Dremptic, 2020; Cek & Eyupoglu, 2020) is now well known. A recent paper by Mervelskemper and Streit (2017) documents that divergences between ESG disclosures and substantive actions redirect inquiry toward greenwashing dynamics, temporarily boosting perceptions but risking reversals as in the general cost-benefit model of Delmas and Burbano (2011) through the misrepresentation mechanism of Lyon and Montgomery (2015). Walker and Wan (2012) document broadly similar findings in Canadian noncompliant emitters. Unlike these papers, which study particular contexts, our analysis explores the extent to which greenwashing affects market performance more generally, including operational capabilities, reputation, and financing constraints, as in Zou and Xiao (2024).

Recent theoretical work emphasizes the importance of stakeholder monitoring and institutional pressures for greenwashing outcomes. In particular, Sun and Wu (2019) show

that greenwashing can generate short-term gains before exposure but lead to negative impacts afterward, using PetroChina as a case. Their model provides strong theoretical motivation for our empirical analysis of dual effects. More generally, beginning with Delmas and Burbano (2011), researchers have studied the role of immediate benefits versus long-term risks in ESG misrepresentation and the extent to which stakeholders should be expected to curb or expose it. In a related study, Lyon and Montgomery (2015) show that greenwashing firms experience ROA declines post-exposure and that sensitivity to industry scrutiny is evident in panel data. Measuring the extent to which greenwashing's performance reversals can be attributed to reputation damage, legal risks, and investor reactions follows naturally from this theory and empirical evidence.

## 2.3 Hypothesis development

### 2.3.1 Hypothesis 1: Greenwashing and firm value

When proposing the hypothesis of the impact of ESG “greenwashing” on corporate market performance, this study chooses to focus on market performance rather than financial performance, mainly based on the following considerations: market performance can more sensitively reflect the externalities of ESG “greenwashing” behavior. Due to the direct impact of ESG information disclosure on investor expectations and consumer trust (Delmas & Burbano, 2011), market participants’ identification and response to “greenwashing” often have immediacy and foresight, while financial performance is affected by multiple factors such as internal cost control and supply chain adjustments, resulting in lag and noise (Lyon & Montgomery, 2015). In addition, the core contradiction of ESG “greenwashing” lies in the discrepancy between the sustainable values claimed by companies and their actual actions. This “inconsistency” is more easily captured and verified through market signals rather than relying on lagging financial data. Therefore, taking market performance as the entry point can more accurately reveal the short-term impact and dynamic feedback mechanism of “greenwashing” behavior.

At present, there is still a lot of room for expansion in the academic community’s exploration of ESG “greenwashing”. Although most scholars believe that “greenwashing” is negatively correlated with corporate performance, there are also some scholars who pay attention to the dynamic mechanism of the impact of “greenwashing” on corporate performance. In the short term, fulfilling ESG responsibilities requires companies to pay a relatively high cost, which can damage their short-term profits. Therefore, most companies do not have the initiative to take on ESG responsibilities in markets where ESG mandatory disclosure is not perfect. However, “greenwashing” gives companies the possibility of achieving a “win-win”

situation in the short term. Once “greenwashing” is successful, companies can obtain substantial benefits, such as economic benefits and a better reputation, without having to pay actual costs. Due to information asymmetry, in the early stages when “greenwashing” behavior is not recognized by the market, companies can strategically package ESG performance to convey false sustainability commitment signals to investors, triggering short-term upward market valuation expectations, easing financing constraints, and enhancing the company’s market image. In the long run, on the one hand, the external exposure risk of enterprises increases. As time goes by, the substantive emptiness of the “greenwashing” behavior of enterprises gradually becomes exposed, and the image of the responsible person shaped by symbolic disclosure will eventually collapse. Once the opportunistic “greenwashing” behavior is exposed, it will impact the production and operation, market sales, and brand reputation of the enterprise, ultimately reducing its market performance. On the other hand, companies face the risk of resource mismatch and distorted values internally. When “greenwashing” becomes a normalized means for companies to cope with ESG compliance pressure, regulatory deficiencies that are not discovered in the short term will have a negative impact on the development of the company. Xiao Hongjun et al. (2013) believe that this will lead companies to neglect internal quality improvement and invest limited resources in pseudo social responsibility behaviors such as “greenwashing”, thereby affecting the company’s sustainable development capabilities; Li Hongjun (2010) and others also believe that “greenwashing” will permeate organizational culture, reduce employee motivation and loyalty to the company, and ultimately lead to the company being eliminated by the market. Therefore, this article proposes the following hypothesis:

***Hypothesis 1: Corporate ESG “greenwashing” positively affects firms’ current market performance.***

### 2.3.2 Hypothesis 2: The relationship between Greenwashing and Firm value reverses in the long-term

Building on the corporate finance literature's documentation of non-linear relationships between firm attributes and Tobin's Q as a proxy for firm value, we propose that the association between greenwashing—deceptive environmental claims—and firm value exhibits a reversal over time, turning negative in the long term. Analogous to the inverted U-shaped link between corporate social responsibility (CSR) and shareholder value observed by Sun et al. (2019), where initial engagements enhance Tobin's Q through stakeholder benefits but excessive commitments erode it via resource depletion, greenwashing may initially mimic genuine



sustainability efforts to inflate short-term perceptions and valuations by appealing to environmentally conscious investors and consumers. However, akin to the U-shaped environmental performance-Tobin's Q relation in Ghosh et al. (2023), where low performance initially hampers value until thresholds enable positives, prolonged greenwashing risks detection through increased scrutiny, regulatory penalties, and reputational damage, ultimately diminishing firm value as market participants adjust expectations downward. This dynamic is further echoed in curvilinear patterns like managerial ownership (Morck et al., 1988; McConnell and Servaes, 1990) and stakeholder management variation (Laplume et al., 2022), where excesses lead to entrenchment or imbalances that undermine performance. Contextual moderators such as governance strength (Kim and Lu, 2011) and market conditions could amplify this reversal, suggesting that while greenwashing might yield transient gains, it negatively predicts long-term firm value by fostering inefficiencies and eroding trust. Thus, we propose hypothesis 2.

**Hypothesis 2: *The relationship between greenwashing and firm value reverses in the long term, with greenwashing negatively predicting firm value over extended horizons.***

### 2.3.3 Hypothesis 3: Explaining the non-linear relationship by financing constraints and R&D development.

Some studies have shown that the impact of ESG “greenwashing” behavior on corporate market performance is not non-linear or static, but presents dynamic transmission characteristics in the time dimension through two differentiated paths. Combining stakeholder theory, signal theory, reputation theory, and resource-based theory, this article proposes the following transmission mechanism hypotheses:

#### 2.3.3.1 Current transmission mechanism of “financing constraints”

ESG greenwashing is essentially a strategic behavior of companies using information asymmetry to transmit false signals to the market. Based on signal theory, in the short term, companies can create a false impression of “high ESG quality” for stakeholders by exaggerating environmental commitments, selectively disclosing social responsibility results, or fabricating governance outcomes. The transmission logic of this behavior on market performance is reflected as follows: on the one hand, there is a lag in verifying whether ESG disclosure information is substantive or symbolic in the capital market. Due to the high difficulty of quantifying ESG performance and the long-term effectiveness, investors heavily rely on information voluntarily disclosed by companies and ratings from third-party institutions when making decisions. However, the mandatory disclosure system for ESG reports has not yet been established, the content has not yet been forcibly introduced into third-party supervision, and

the relevant legislation is incomplete. This has led to companies being able to inflate their ESG scores through “greenwashing” behavior at a lower cost of error, releasing signals of strong sustainable development capabilities in the future, and attracting short-term inflows of preference-based capital such as ESG-themed funds and green credit. This capital allocation strategy serves to lower capital procurement expenses, optimize equity valuation metrics, and consequently bolster short-term market returns. Concomitantly, the green lending initiatives of banking entities create regulatory arbitrage opportunities for organizational greenwashing. As stipulated in China’s CBIRC Green Lending Directives (China Banking and Insurance Regulatory Commission), corporate ESG ratings constitute a critical evaluation criterion for credit authorization. When companies obtain artificially high ESG scores through greenwashing, they may obtain loans at lower interest rates or extend repayment periods. The alleviation of such financing constraints will directly improve the company’s cash flow and send signals to investors that the company has sufficient liquidity and controllable debt risk, coupled with the sustainable development expectations shaped by ESG “greenwashing”, further boosting valuations.

In summary, ESG “greenwashing” mainly affects market performance through the chain of “signal misleading capital inflow financing constraint relief” in the current period. The key to this transmission path lies in the short-term information blind spots in the capital market, which allows “greenwashing” enterprises to exchange low-cost signals for resource premiums. Therefore, this article proposes the following hypothesis:

***Hypothesis 3a: ESG “greenwashing” significantly improves a company’s current market performance by alleviating financing constraints, and financing constraints play a positive mediating role in the relationship between “greenwashing” and current market performance.***

#### 2.3.3.2 Delayed transmission mechanism of “Innovation capability”

The negative effects of ESG “greenwashing” on the future market performance of enterprises essentially stem from its systematic erosion of innovation capabilities. This study focuses on one of the core elements of a company’s sustainable development capability - the ratio of R&D personnel (number of R&D personnel/total number of employees), revealing the dynamic process of “greenwashing” behavior inhibiting innovation through a dual path of resource squeezing and organizational culture degradation. When enterprises transform ESG into “image engineering”, their resource allocation logic will prioritize meeting short-term compliance needs: on the one hand, based on the theory of resource mismatch, a large amount

of funds is invested in surface innovation activities such as ESG report beautification and packaging of false environmental protection cases, squeezing the budget space for substantive technology research and development. Enterprises suffering from “greenwashing dependency syndrome” have a decreased need for a complete research team compared to normal enterprises, resulting in a structural shift in talent demand. Enterprises are more inclined to hire “surface innovative” personnel who are skilled in copywriting and public relations communication, rather than high-cost engineers and scientists. At the same time, companies that rely on “greenwashing” may also have the phenomenon of scientific research projects being virtualized, with a large number of R&D projects becoming “paper innovations” that cooperate with ESG ratings, and substantive technology public relations teams may face difficulties such as dissolution due to insufficient resources; On the other hand, based on the theory of organizational identity, the distortion of values caused by “greenwashing” behavior may deeply damage the organizational cultural ecology. When employees discover that the company’s promoted vision of “green transformation” deviates significantly from their actual behavior, their trust and professional identity in management will quickly crumble. As a highly educated and professional group, R&D personnel are more sensitive to technical ethics and organizational integrity. Once a company falls into the “greenwashing” trap, high-level scientific research talents will accelerate their turnover due to the prediction that the company lacks the potential for technological breakthroughs. At the same time, once the phenomenon of “greenwashing” exposure occurs, the reputation of the enterprise in the market collapses, making it even more difficult to recruit excellent scientific research talents. This structural degradation of human capital will become apparent 2-3 years later: the shrinking size of the R&D team will lead to the depletion of technological reserves, product iteration speed will lag behind industry standards, and ultimately be re-priced as a “low competitive enterprise” by the capital market, triggering a cliff-like decline in future market performance.

In summary, ESG “greenwashing” has led to a continuous decline in the proportion of R&D personnel, a core indicator of innovation capability, through a dual mechanism of “resource mismatch → shrinking talent demand” and “cultural dishonesty → loss of human capital”. When the capital market recognizes the essence of “pseudo innovation” in enterprises, it will adjust the valuation of their sustainable development capabilities, forming a transmission loop of “greenwashing” behavior that will backfire on future market performance. Therefore, this article proposes the following hypothesis:

***Hypothesis 3b: ESG “greenwashing” weakens the innovation capability of enterprises by reducing the proportion of future R&D personnel, thereby significantly reducing the***

*market performance of enterprises after two periods. Innovation capability plays a negative mediating role in the relationship between “greenwashing” and future market performance.*

### 3. Data and Methodology

#### 3.1 Sample Selection

This article selects Chinese A-share listed companies from January 1, 2009, to December 31, 2023, as the research sample. To ensure the validity of the data, this article refers to relevant research to process the data as follows: (1) Remove the financial and insurance industry, ST and \* ST companies; (2) Remove enterprises with core dependent variables and independent variables with missing values; (3) To control the bias caused by extreme values on the test results, Winsorize the continuous variables at 1% on both sides. Based on the above processing, 14119 unbalanced panel data were finally obtained. The core data sources of this article include the CSMAR Guotaian database, Wind database, Bloomberg database, and Huazheng ESG database.

#### 3.2 Variable Construction

##### 3.2.1 Dependent variable

Enterprise Market Performance (TobinQ). Zou Yanfen et al. (2024) divided corporate performance into financial performance and market performance. Currently, scholars usually use the return on total assets (ROA) to measure financial performance and TobinQ to measure corporate market performance (Lee & Suh, 2022). This study chose TobinQ as the dependent variable, and the core logic is that ESG “greenwashing” behavior mainly affects corporate value through market expectation correction, rather than directly affecting short-term financial performance. TobinQ uses the ratio of enterprise market value to asset replacement cost to comprehensively reflect investors’ forward-looking assessment of the company’s future growth potential and risk premium, and can sensitively capture market sentiment fluctuations caused by “greenwashing”. Compared to financial indicators such as ROA, TobinQ avoids interference from internal cost control or accounting policy adjustments, and more directly reflects the dynamic pricing of ESG authenticity in the market. The higher the TobinQ value, the better the company’s market performance.

##### 3.2.2 Independent variables

ESG “greenwashing” (ESG). Based on the review of domestic and foreign literature, the current methods for measuring ESG “greenwashing” mainly include text analysis and rating difference methods. The text analysis method includes content analysis and vocabulary counting, and its measurement method is more subjective and diverse compared to the scoring difference method. This article chooses the more objective and unified scoring difference method, and follows the approach of Yu et al. (2020) to define “greenwashing” enterprises as those that seek to create a responsible public image through a large amount of ESG data, but perform poorly in actual ESG performance. Based on definitions and data from third-party ESG rating agencies, the relative “greenwashing” score of a company’s peers is calculated as follows: (standardized measurement score of the company’s relative position in the Bloomberg ESG disclosure rating distribution) - (standardized measurement score of the company’s relative position in the ESG performance rating distribution). This relative “greenwashing” score can quantify the difference between a company’s substantive and symbolic ESG disclosures, thereby measuring the degree of the company’s ESG “greenwashing” behavior.

In terms of symbolic disclosure measurement, most scholars currently use the Bloomberg ESG disclosure score based on Yu et al.’s (2020) method, because its scoring criteria only adopt the ESG data disclosed by the company to the public, and do not measure the actual ESG performance of the enterprise. Bloomberg’s disclosure score calculation includes over 900 key disclosure indicators, with disclosure scores ranging from 0 to 100 points, with disclosure quantity being the focus. In terms of substantive disclosure measurement, scholars generally believe that Reuters, Huazhong Securities, and Hexun Ratings pay more attention to the substantive ESG performance of enterprises and have a multidimensional evaluation system. This article follows the approach of Fan Yadong et al. (2025) and uses the Huazheng ESG score to measure the substantive ESG performance of enterprises. Huazhong ESG Rating is the first index company in China to release ESG data since 2009, covering over 4500 listed companies on the A-share market. Its rating system follows the financial regulatory principles of the International Organization of Securities Commissions (IOSCO) and is constructed with reference to international standards such as MSCI. This system innovatively adopts localized design, forming a three-dimensional evaluation framework through 16 secondary indicators and 44 tertiary indicators. It not only calculates the amount of ESG information publicly disclosed by enterprises, but also introduces third-party data for cross-validation of disclosure quality. This dual-track verification mechanism of “disclosure behavior consistency” can objectively reflect the actual level of responsibility performance of enterprises, and effectively identify and compress the operational space for enterprises to “greenlight” through text modification or

information screening, providing an evaluation benchmark for the domestic market that combines international norms and Chinese practical characteristics. In summary, the ESGg “greenwashing” score constructed in this article is:

$$ESGg_{i,t} = \left( \frac{ESG_{dis_{i,t}} - \overline{ESG_{dis}}}{\sigma_{dis}} \right) - \left( \frac{ESG_{per_{i,t}} - \overline{ESG_{per}}}{\sigma_{per}} \right)$$

Among them, the first item is a standardized measurement standard for the company’s relative position in the distribution of ESG rating disclosure scores compared to peers, and the second item is a standardized measurement standard for the company’s relative position in the distribution of ESG rating performance scores compared to peers. The larger the ESG score value, the more severe the “greenwashing” of the enterprise.

### 3.2.3 Mediating variables

Financing constraints (SA). The measurement systems for funding limitations within scholarly works are mainly categorized into dual typologies: the unidimensional metric method and the multivariate comprehensive indicator method. The former uses single-dimensional financial indicators such as the interest coverage ratio and dividend payout ratio, while the latter constructs a composite indicator system through multidimensional parameters, such as the SA, FC, and WW indices. Compared to the former, the multivariate comprehensive indicator method has stronger theoretical explanatory power and empirical effectiveness by integrating multidimensional financial information and corporate governance characteristics. Building upon the methodological framework of Zhang Xuan et al. (2019), this study employs the non-negative magnitude of the SA index as a proxy for quantifying funding limitations. The higher the index magnitude, the more pronounced the capital accessibility challenges confronting the enterprise. The specific formula is:

$$SA = -0.737 \times Size + 0.043 \times Size^2 - 0.04 \times Age$$

Among them, Size represents the logarithmic transformation of total assets, Age denotes the firm's operational tenure, and the SA index, independent of endogenous financial metrics, exhibits exogeneity.

Innovation capability (RDP). In extant scholarship, metrics for assessing organizational innovation capacity encompass R&D expenditure intensity, patent grants, new product development cycles, and R&D workforce ratio. Based on the theory of resource mismatch, enterprises suffering from “greenwashing dependence” have a reduced need for a complete research team compared to normal enterprises, leading to a structural shift in talent demand;

Based on the theory of organizational identity, the distortion of values caused by “greenwashing” behavior may deeply damage the organizational cultural ecology, leading to problems such as the loss of innovative talents and difficulties in talent recruitment. In summary, this article employs the R&D workforce ratio in enterprises as the core surrogate measure for innovation capacity. This metric is calculated as the quotient of annual R&D personnel to total organizational headcount, with the dataset obtained from the CSMAR database detailing employee composition in listed firms. This indicator can intuitively reflect the sustained human resource investment in enterprises in innovative activities. Compared with financial indicators such as R&D expenditure, it can better characterize the organizational foundation of enterprise innovation capability. In order to eliminate the influence of extreme values, this article takes the natural logarithm of the number of R&D personnel by adding 1. The larger the indicator, the stronger the sustainable innovation capability of the enterprise:

$$RDP_{i,t} = \frac{\ln(\text{Annual number of R\&D personnel}_{i,t} + 1)}{\ln(\text{Total number of employees in the enterprise}_{i,t} + 1)}$$

### 3.2.4 Moderating variables

Institutional Investor Equity Ratio (INV). In the moderating effect test, the measurement of the Institutional Investor Equity Ratio needs to reflect their dynamic intervention ability in corporate information disclosure and market response. Referring to the research of Du Jian et al. (2023), this article uses the percentage of institutional investors’ holdings at the end of the year as a proxy variable, including insurance companies, trusts, QFII, Securities firms, funds, social security, banks, finance companies, and non-financial institutional investors. The specific calculation formula is:

$$INV_{i,t} = \frac{\text{Total number of shares held by institutional investors}_{i,t}}{\text{Outstanding A – shares}_{i,t}} \times 100\%$$

External regulatory pressure (Pre). This article follows the approach of Gao Qinwei et al. (2016) and uses “whether the enterprise accepts third-party agency testing (Cert)” as a proxy variable for external regulatory pressure. This variable is a binary dummy variable. If the enterprise undergoes compliance testing on its products or services by independent third-party organizations recognized or authorized by the government (such as testing and certification centers, environmental assessment companies, etc.) during the reporting period, it is assigned a value of 1. Otherwise, it is assigned a value of 0. At the same time, in order to comprehensively measure the external regulatory pressure faced by enterprises, following the approach of Fang

Rui et al. (2024), two sets of binary dummy variables are included: whether ESG disclosure follows the GRI Sustainable Development Reporting Guidelines (GRI) and whether auditors come from the Big 4 accounting firms. If so, they are assigned a value of 1; otherwise, they are assigned a value of 0. All three sets of data are sourced from the CSMAR-listed company social responsibility report database.

### 3.2 Summary Statistics

This study conducted descriptive statistical analysis on 19 core variables, and the descriptive statistics of each major variable are shown in Table 5.1. The maximum value of the independent variable ESG “greenwashing” (ESG) is 3.244, the minimum value is -2.526, and the median is -0.061, indicating that some companies are severely “greenwashing”, while the overall market is still in a responsible state dominated by substantive disclosure. In the specific segmentation, the average values of environmental information “greenwashing” (Eg), social information “greenwashing” (Sg), and governance information “greenwashing” (Gg) are 0.024, 0.043, and -0.003, respectively, indicating that the overall environmental and social information “greenwashing” in the market is more severe, while the standard deviation of governance information “greenwashing” is the largest at 1.428, representing greater individual differences among enterprises; The significant difference between the mean and median of the Dependent variable TobinQ, which is 1.720 and 1.098, indicates the presence of a rightward tailing effect in overvalued firms. The Financing Constraints Index (SA) takes an absolute value, so the data are all positive, and the standard deviation is 0.356, indicating that the overall level of financing constraints among enterprises is relatively small. Due to the lack of clear disclosure of the proportion of R&D personnel by some companies, there are some missing samples in Innovation Capability (RDP), with a median of 6.5, significantly lower than the mean of 10.718, confirming that a few high R&D companies are driving up the overall market level. Due to the selection of the total number of shares held by institutional investors and their proportion of outstanding A-shares, the maximum value of the Institutional Investor Equity Ratio (INV) is 599.199%, which is greater than 100%. The social responsibility reports of listed companies under external regulatory pressure (Pre), whether they have been verified by third-party institutions (Cert), whether their ESG disclosures follow the GRI Sustainable Development Reporting Guidelines (GRI), and whether their auditors come from the Big Four accounting firms (Big4) are all dummy variables, with mean values of 0.030, 0.205, and 0.153, respectively, indicating that the vast majority of companies in the A-share market face low external regulatory pressure. In terms of corporate governance, the median equity concentration (CR)



of 59.89% is basically consistent with the mean of 59.667%, but the top ten shareholders hold the highest 94.33% of the shares, indicating that some companies have absolute control. The mean of the financial structure index (Lev) is 0.498, which is close to the median of 0.506, confirming the industry norm that the overall debt ratio of the sample enterprises remains stable at around 50%. Overall, the descriptive statistical analysis results of the sample companies are consistent with the actual situation and can represent the sample population.

<Insert Table 1>

## 4. Main Empirical Results

### 4.1 Greenwashing and Firm Value

In this section, we select unbalanced panel data of A-share listed companies from 2009 to 2023 and use the ordinary least squares (OLS) method for benchmark regression analysis.

To verify hypothesis 1, that is, the relationship between ESG “greenwashing” and corporate market performance, this paper uses the ordinary least squares method to establish Model 1 based on non-equilibrium panel data to explore the relationship between the current period and the lag period, respectively. Among them is a series of control variables and  $Controls_{i,t}$  is the error term.  $\varepsilon_{i,t}$

Model 1: The Relationship between ESG “greenwashing” and Market Performance

$$TobinQ_{i,t} = \beta_0 + \beta_1 ESGg_{i,t} + \varphi_i Controls_{i,t} + fixed\ effect + \varepsilon_{i,t} \quad (1)$$

<Insert Table 2>

Table 2 shows the results of the baseline regression analysis. The benchmark effect regression of this study is mainly divided into two parts. The first four columns of regression verify the impact of ESG “greenwashing” and its sub-dimensions of environmental, social, and corporate governance information “greenwashing” on the current market performance of enterprises. The last four columns of regression verify the impact of two lagged periods of ESG “greenwashing” and its subdimensions on the market performance of enterprises. The results of the first part indicate that ESG “greenwashing” is positively correlated with the current market performance of enterprises at a significant level of 1%, indicating that, based on sample data, the deeper the degree of ESG “greenwashing” of enterprises, the better the current market performance on average. Through symbolic disclosure, companies release positive signals to

investors that they will fulfill their ESG responsibilities in the future, enhance market evaluation of the company, reduce financing constraints, and thus improve the company's current market performance. Specifically, based on regression (2) to (4), the “greenwashing” of corporate environmental information, social information, and corporate governance information is positively correlated with the current market performance of the enterprise at a significant level of 1%, and the “greenwashing” of environmental information has the greatest impact on the market performance of the enterprise. Compared to social responsibility information and corporate governance information, environmental responsibility information has the characteristics of high implementation difficulty, large initial investment, and long verification cycle. Therefore, the risk of “greenwashing” exposure of environmental responsibility information by enterprises is lower, and it is easier to attract investment in environmentally friendly themes. In summary, H1a is valid, Corporate ESG “greenwashing” positively affects firms' current market performance.

## 4.2 Long-term effect: Greenwashing and Firm value

To verify hypothesis 2, that is, the relationship between ESG “greenwashing” and corporate market performance, this paper uses the ordinary least squares method to establish model 2 based on non-equilibrium panel data to explore the relationship between the current period and the lag period, respectively. Among them is a series of control variables and  $Controls_{i,t}$  is the error term.  $\varepsilon_{i,t}$

Model 2: The Relationship between Lag Two Period ESG “greenwashing” and Market Performance

$$TobinQ_{i,t} = \beta_0 + \beta_1 ESGg_{i,t-2} + \beta_1 Squared ESGg_{i,t-2} + \varphi_i Controls_{i,t} + fixed\ effect + \varepsilon_{i,t} \quad (2)$$

<Insert Table 3>

Table 3 indicates that ESG “greenwashing” with a lag of two periods is negatively correlated with corporate market performance at a significance level of 1%. This suggests that based on the sample data, the deeper the degree of ESG “greenwashing” of a company, the worse the market performance after two years on average. After companies release false signals through symbolic disclosure, the risk of external exposure increases over time, and companies that rely on greenwashing may face problems such as distorted corporate culture, talent loss, and lack of sustainable innovation capabilities, thereby reducing market evaluation of the company and lowering its market performance. Specifically, based on regression (2) to (4), the

lagged two periods of environmental information “greenwashing” are positively correlated with corporate market performance at a significance level of 1%, while the lagged two periods of social information and corporate governance “greenwashing” are negatively correlated with corporate market performance at a significance level of 1%, and corporate governance “greenwashing” has the greatest impact on corporate market performance. The verification cycle of environmental responsibility information is relatively long, and the exposure risk after “greenwashing” is relatively low. Although it still promotes the market performance of enterprises two years later, its promotion degree has decreased. Corporate governance information is relatively easy to verify and is related to social opinion orientation, so the exposure risk is higher, and it is more likely to affect corporate culture, reduce corporate cohesion, and lead to structural talent shortage in enterprises. Overall, H2 is valid; corporate ESG “greenwashing” negatively affects firms’ future market performance.

In terms of controlling variables, the coefficient of enterprise size is significantly negative, and the larger the size, the worse the market performance, which may be due to the decrease in asset efficiency or the proportion of liquid assets caused by diseconomies of scale. The asset liability ratio coefficient is significantly negative, and a high debt ratio exacerbates financial risks. Investors’ concerns about the company’s debt paying ability and rising bankruptcy costs suppress market valuations; The coefficient of equity concentration is significantly positive, which helps to reduce agency costs, strengthen strategic execution efficiency under the supervision of major shareholders, and enhance market confidence; The internal control coefficient is significantly positive, and effective internal control can improve operational efficiency, optimize resource allocation, reduce operational risks, and enhance external information transparency, thereby improving the market’s judgment of the long-term value of the enterprise; The coefficient of enterprise growth is significantly positive, and high growth expectations attract investors to pay a premium, reflecting optimistic judgments about future income expansion and investment opportunities. Overall, the regression results of the controlled variables are consistent with the research conclusions of previous scholars.

#### 4.3 Mechanism Explanation in the Short-Term: Financing Constraint

The motivation for corporate ESG “greenwashing” behavior is complex, as it may stem from opportunistic tendencies driven by short-term interests or passive compliance needs under institutional pressure. The benchmark regression results indicate that ESG “greenwashing” has a dynamic impact on corporate market performance, showing a promoting effect in the current period and an inhibitory effect in the long term. This discovery validates the core viewpoint of

signal theory and stakeholder theory: companies obtain market premiums through low-cost false signals during periods of information asymmetry, but over time, exposure to signal distortion risks will trigger reputation penalty effects. To further reveal the impact path of ESG “greenwashing” on market performance, this section tests the current transmission mechanism of financing constraints and the lagged transmission mechanism of innovation capability based on the theoretical assumptions in the previous section. The inspection results are shown in Table 4.

<Insert Table 4>

The mediating effect regression of this study is mainly divided into two parts. The first three columns verify the current transmission mechanism between ESG “greenwashing” with financing constraints as the mediating variable and corporate market performance. The last three columns verify the lagged transmission mechanism between ESG “greenwashing” with innovation capability as the mediating variable and corporate market performance. The method used is based on the mediating effect test method proposed by Wen Zhonglin et al. (2004). In the first part, regression results (1) indicate that ESG “greenwashing” is negatively correlated with corporate financing constraints at a significance level of 1%, indicating that the more severe the ESG “greenwashing” of a company, the lower the current financing constraints on average. Enterprises use strategic disclosure of false ESG signals to convey the illusion of “high ESG quality” to the capital market, attracting ESG-themed funds such as green credit and ESG investment funds, reducing financing costs and extending debt maturities, thereby alleviating financing constraints. Regression result (2) indicates a negative correlation between financing constraints and market performance of enterprises at a significant level of 1%, suggesting that the lower the financing constraints, the higher the average market performance of enterprises. Investors interpret lower financing constraints as positive investment signals of ample liquidity and controllable debt risk for the company, coupled with sustainable development expectations shaped by ESG “greenwashing”, further driving up the company’s valuation. The regression result (3) indicates that after adding both the independent variable ESG “greenwashing” and the mediating variable financing constraint, the coefficient of the independent variable remains significantly positive, indicating that financing constraint partially mediates the relationship between ESG “greenwashing” and corporate market performance. In summary, assuming H2a is validated, that is, ESG “greenwashing” significantly improves a company’s current market performance by alleviating financing constraints, and financing constraints play a positive mediating role in the relationship between “greenwashing” and current market performance.

## 4.4 Mechanism Explanation in the Long-term: Research and Development

<Insert Table 5>

In Table 5, regression result (1) indicates that there is a significant negative correlation between lagged two periods of ESG “greenwashing” and corporate innovation capability, i.e. the proportion of R&D personnel, at the 1% level. This suggests that the more severe the ESG “greenwashing” of a company, the lower the proportion of R&D personnel in the next two years on average, leading to a sustained decline in innovation capability. The dependence of enterprises on “greenwashing” leads to the misallocation of core resources to surface innovation activities, squeezing the budget space for substantive technology research and development, thereby reducing the urgent need for a complete research team and causing a structural shift in the demand for talent in enterprises. At the same time, the “greenwashing” behavior damages the organizational cultural ecology, reduces the trust of talents in the enterprise, accelerates talent loss, exposes the false image of the enterprise, increases the difficulty of recruiting excellent scientific research talents, ultimately reduces the proportion of R&D personnel, and lowers the sustainable innovation capability of the enterprise. The regression result (2) indicates a positive correlation between innovation capability and market performance of enterprises at a significant level of 1%, indicating that the weaker the substantive innovation capability of enterprises, the lower the proportion of R&D personnel, and on average, the lower the market performance of enterprises. The shrinking size of enterprise R&D teams has led to a focus on promotion over research and development, surface over substance, and a risk of depletion in technology storage and distribution. The product iteration speed lags behind the industry level, resulting in loss of consumer favor and being re-priced as a “low competitive enterprise” by the capital market, ultimately leading to a decline in future market performance. The regression result (3) indicates that after adding both the independent variable lagged by two periods of ESG “greenwashing” and the mediating variable innovation capability, the coefficient of the independent variable remains negative, indicating that innovation capability partially mediates the relationship between lagged by two periods of ESG “greenwashing” and corporate market performance. In summary, assuming H2b is validated, that is, ESG “greenwashing” weakens a company’s innovation capability by reducing the proportion of future R&D personnel, thereby significantly reducing the company’s market performance after two periods. Innovation

capability plays a negative mediating role in the relationship between “greenwashing” and future market performance.

## 5. Robustness Tests

### 5.1 Moderation Effect on Institutional Ownership, Social Responsibility, ESG disclosure, and Firm Auditing

In order to shape the market image of ESG-friendly enterprises and obtain valuation premiums, companies are gradually strengthening the systematic construction of ESG information disclosure, investment management, and strategic planning. Existing research indicates that there is a significant regulatory pathway for the impact of ESG “greenwashing” on market performance: firstly, institutional investors, as the main body of ESG information screening in enterprises, have a direct impact on the market’s recognition efficiency of “greenwashing” behavior in terms of their shareholding ratio; Secondly, market regulation imposes external constraints on enterprises implementing the “greenwashing” strategy by increasing the risk of exposure to violations. Based on this, this section constructs an interaction effect model to empirically test the heterogeneous impact of institutional investors’ shareholding ratio and regulatory intensity on the economic consequences of corporate ESG “greenwashing” behavior, with a focus on revealing the marginal utility differences of “greenwashing” strategies under different governance contexts.

Verifies the heterogeneous impact of year-end institutional investor equity ratio as a moderating variable on the economic consequences of current ESG “greenwashing” behavior. The last three columns respectively examine whether the social responsibility reports of listed companies have been verified by third-party institutions, whether ESG disclosures refer to GRI’s “Sustainable Development Reporting Guidelines”, and whether auditors come from the Big Four accounting firms as proxy variables to measure external regulatory pressure on enterprises, verifying their heterogeneous impact on the economic consequences of lagged two periods of ESG “greenwashing” behavior. It should be noted that in the analysis of the regulatory effect of institutional investors, this article lagged the year-end institutional investor equity ratio (INV) for one period. The practical basis for this design is that institutional investors typically obtain their annual ESG practice information through the ESG reports released by the company at the end of each year, and based on this, make predictions about the

company's sustainable development capabilities and market value for the next year. Laging investors' shareholding ratios behind ESG "greenwashing" behavior and market performance can accurately capture the dynamic transmission mechanism of "information reception decision adjustment market response". In terms of the regulatory effect of external regulatory pressure, this article uses indicators such as social responsibility report verification, GRI standard adoption, and the four major audits, with a lag period set between the lagged two periods of ESG "greenwashing" (T-2 period) and current market performance (t period). This design simulates the verification cycle of regulatory pressure - when a company implements "greenwashing" in phase T-2, third-party institutions need to go through information disclosure verification and market supervision in phase T-1, and ultimately form substantive constraints on violations in phase T, thus truly reflecting the regulatory punishment effect after the exposure of "greenwashing" behavior.

<Insert Table 6>

From Table 6, in the first part, regression (1) indicates that although there is a positive correlation between the shareholding ratio of institutional investors at the beginning of the year and the market performance of enterprises, it did not pass the significance test. After adding the interaction term, the coefficient of the interaction term between ESG "greenwashing" and the Institutional Investor Equity Ratio's equity at the beginning of the year is positively correlated at a significance level of 1%, revealing that the regulatory effect of institutional investors has a statistically significant economic effect. Enterprises with a high Institutional Investor Equity Ratio's shareholding can transmit positive signals to the market through symbolic ESG disclosure, especially when investors are more concerned about the company's ESG compliance. Such strategic information disclosure can significantly enhance the market's expected valuation of the company's sustainable development capabilities. From the perspective of behavioral finance, the "ESG preference illusion" of institutional investors may cause them to overestimate the environmental governance effectiveness of "greenwashing" companies during the lag period of information verification, thereby forming a short-term valuation premium. Therefore, assuming H3a is validated, that is, the shareholding ratio of institutional investors positively moderates the relationship between ESG "greenwashing" and current market performance, that is, the higher the Institutional Investor Equity Ratio, the more significant the improvement effect of "greenwashing" behavior on current market performance.

In the second part, regression results (2) - (4) indicate that there is a negative correlation between social responsibility report verification, adoption of GRI standards, and the four major

audits and corporate market performance, but it did not pass the significance test. After incorporating interactivity, the interaction coefficient between the t-1 GRI standard, the four major audits, and the t-2 ESG “greenwashing” was positively correlated at a significance level of 1%, confirming that external regulatory pressure exacerbates the economic consequences of “greenwashing” behavior through delayed punishment mechanisms - when companies face strong regulatory constraints, the probability of their historical “greenwashing” behavior being exposed increases, triggering a systematic reassessment of ESG information credibility by investors, ultimately leading to a decline in market performance through the “information reputation discount effect”. The interaction term of social responsibility report verification is not significant, which may be due to the insufficient statistical effectiveness caused by only 2.99% of enterprises in the sample accepting verification, and it cannot be ruled out that effective market signals have not been formed due to the blurring of verification standards. In summary, assuming H3b is validated, external regulatory pressure has a positive moderating effect on the relationship between corporate ESG “greenwashing” and future market performance. That is, the greater the external regulatory pressure, the more significant the inhibitory effect of “greenwashing” behavior on future market performance.

## 5.2 Heterogeneity in Firm Ownership: State-owned vs. Non-state-owned

In the absence of a standardized and unified regulatory system, in addition to the influence of external market environmental factors, the disclosure of ESG performance information by enterprises will also be affected by internal characteristics of the enterprise (Li et al., 2021). Therefore, this article examines the heterogeneity of the impact of ESG “greenwashing” on corporate market performance from the perspective of property rights.

<Insert Table 7>

This study is divided into two parts based on the heterogeneity analysis of property rights. The first two columns analyze the relationship between ESG “greenwashing” of state-owned and non-state-owned enterprises and their current market performance, while the latter two columns analyze the relationship between ESG “greenwashing” of state-owned and non-state-owned enterprises lagging behind by two periods and their market performance. From the regression results in Table 7, it can be seen that ESG “greenwashing” has a dynamic effect of “short-term promotion, long-term inhibition” on the market performance of both state-owned and non-state-owned enterprises. To verify the heterogeneity of the impact of ESG “greenwashing” on market performance between state-owned enterprises (SOE=1) and non-state-owned enterprises (SOE=0), this paper uses Permutation Test to statistically infer the



grouped regression coefficients. After 500 permutation tests, the inter group coefficient difference of the core variable ESG g was -0.053, with a permutation P-value of 0.022, indicating a significant difference in the current market effect of ESG “greenwashing” between state-owned and non-state-owned enterprises at the 5% significance level. In the current effect, the short-term market premium effect of ESG “greenwashing” in non-state-owned enterprises is stronger (coefficient=0.115 vs 0.062), which may be due to the fact that non-state-owned enterprises are more likely to attract investors’ attention when releasing positive signals to the market through ESG “greenwashing” compared to state-owned enterprises, thus quickly attracting market-oriented resources such as ESG-themed investment funds and green credit, forming a “signal amplification effect”. However, due to undertaking policy-oriented ESG tasks such as carbon-neutral investment and targeted poverty alleviation, state-owned enterprises’ ESG disclosures are often seen by the market as “compliance strategies” rather than substantive commitments, resulting in weak marginal market reactions to “greenwashing”.

When the ESG “greenwashing” behavior lags behind by two periods, after 500 permutation tests, the inter-group coefficient difference of the core variable L2. ESG is 0.028, and its permutation P value is 0.188, indicating that there is no significant difference in the lagged market effect of ESG “greenwashing” between state-owned and non-state-owned enterprises. This indicates that both non-state-owned and state-owned enterprises find it difficult to completely avoid negative impacts in long-term ESG governance. This is because once a company’s “greenwashing” behavior is exposed by the upstream and downstream of the supply chain or the media, all companies may face reputational damage; At the same time, when enterprises suffer from “greenwashing dependence” and distorted organizational culture, both state-owned and non-state-owned enterprises cannot bear the harm of the loss of high-precision talents and the decline of sustainable innovation capabilities.

### 5.3 Endogeneity test instruments approach

Although this article controls for individual heterogeneity and temporal trends of firms through panel data fixed effects models, there may still be endogeneity issues in the dynamic relationship between ESG “greenwashing” and firm market performance, mainly manifested as reverse causality problems, that is, firms with excellent market performance may have more resources to “beautify” ESG information disclosure, while firms with declining performance may use “greenwashing” to cover up business difficulties. Therefore, this article adopts the instrumental variable method for endogeneity treatment.

This study aims to address the potential bidirectional causal relationship between ESG

“greenwashing” and corporate market performance. Referring to the research of Gao Yingjie et al. (2021), the mean ESG “greenwashing” of other companies in the same industry and province in the same year (ESGg\_IV) was used as the instrumental variable. The ESG system has industry linkage. If peer enterprises in the same region generally engage in “greenwashing” behavior, it will affect the ESG performance of sample enterprises through supply chain management pressure or industry norms. However, this regional industry atmosphere is not directly related to the market performance of individual enterprises, which meets the correlation between instrumental variables and core variables, as well as the requirement of exogeneity.

<Insert Table 8>

The endogeneity test in this article is mainly divided into two parts. The two-stage least squares method (2SLS) using instrumental variables is used to verify whether there is a serious endogeneity problem between ESG “greenwashing” and corporate market performance in the current and lag periods. According to regression (1) and (3), the first stage regression results show that the regression coefficients of instrumental variables and independent variables are positively correlated at the 1% significance level in both the current and lag periods, indicating a significant correlation between instrumental variables and independent variables. According to regression (2) and (4), this study conducted statistical tests on instrumental variables. Firstly, the Kleibergen Paap rk LM statistic showed that under a degree of freedom of 1, the chi-square values were 788.86 ( $p=0.000$ ) and 609.39 ( $p=0.000$ ), respectively. At the 1% significance level, the null hypothesis that “instrumental variables are not related to endogenous variables” was rejected, confirming the strong correlation between the selected instrumental variables and endogenous independent variables (ESG). Secondly, in the weak identification test, the Cragg Donald Wald F statistics were 1085.31 and 835.31, respectively, and the Kleibergen Paap Wald rk F-statistics were 905.09 and 709.40, respectively, both far exceeding the 10% threshold of the Stock Yogo test (19.93), rejecting the weak instrumental variable hypothesis and proving that the instrumental variables in this paper have strong explanatory power in both the current and lag periods. The regression coefficients and significance of regression (2) and (4) are consistent with the baseline regression, indicating the robustness of the baseline regression results.

## 5.4 Alternative Construction of Firm Greenwashing

This study conducted a robustness test on the measurement method of the core variable ESG “greenwashing”. Given the interinstitutional heterogeneity of domestic third-party ESG rating systems, in order to verify the robustness of indicator construction, this study uses the

Hexun ESG rating index to replace the Huazheng ESG rating index and reconstruct the “greenwashing” measurement framework.

<Insert Table 9>

This study selects the Hexun.com ESG rating system as the evaluation benchmark for the quality of substantive ESG information disclosure of enterprises. Its methodological advantages are reflected in three perspectives: firstly, in the evaluation framework dimension, the system innovatively constructs a three-dimensional analysis matrix covering environmental response (E), social value (S), and governance effectiveness (G), forming a multi-level weighting model through 5 core dimensions, 13 secondary indicators, and 37 observational tertiary indicators, demonstrating better systematicity and scientific compared to similar evaluation tools; Secondly, in the process of data collection and processing, Hexun adopts a dual data source cross verification mechanism of annual reports and social responsibility reports of listed companies audited by third parties. Through text structured analysis and quantitative scoring technology, it reduces subjective judgment bias and ensures the reliability and transparency of data generation; Thirdly, at the sample coverage level, the rating system has been continuously tracking the A-share market since 2010, constructing a full cycle, large sample database that includes over 3000 companies, providing an analytical basis for observing the dynamic evolution of corporate ESG behavior. Therefore, choosing Hexun ESG Index to replace Huazheng ESG Index has credibility and feasibility. Due to the fact that the data that can be collected for the Hexun ESG score is from 2010 to 2021, this article has shortened the sample size in the robustness test section of replacing independent variables to ensure that there are no missing values for the core variables. As shown in Table 9, under the simultaneous change of the measurement method of the independent variable ESG “greenwashing” and the shortening of the sample, there is still a significant “short-term promotion, long-term inhibition” dynamic relationship between ESG “greenwashing” and corporate market performance, which is consistent with the benchmark regression results, further proving the robustness of the benchmark regression results.

## 6. Discussion and Limitations

Although this article systematically explores the dynamic relationship between ESG “greenwashing” and corporate market performance, there are still the following limitations: Firstly, the study encounters limitations in sample representativeness and data contemporaneity. Focusing exclusively on A-share listed entities while excluding non-listed firms and over-the-

counter market participants risks underrepresenting SME-specific greenwashing heterogeneity. Additionally, constrained by third-party ESG rating data availability, post-2023 policy intervention effects remain partially unobserved, necessitating an extended temporal scope for robust dynamic analysis. Secondly, there is room for improvement in the measurement method of “greenwashing”. The current “greenwashing” measurement method, based on the difference in ESG ratings between Bloomberg and Huazheng has the advantage of verifiability, but it fails to integrate text analysis techniques and substantive action data. In addition, the differences in indicator weights among different rating agencies may lead to standardized scores deviating from the true level of corporate responsibility. Thirdly, there is insufficient in-depth exploration of the dynamic transmission mechanism. The research focuses on two intermediary pathways: financing constraints and innovation capabilities, but ESG “greenwashing” may affect market performance through other mechanisms. For example, the paths of brand value loss caused by the decline in consumer trust and the increase in transaction costs caused by the deterioration of supply chain partnerships have not yet been included in the analysis framework. Fourthly, there are some residual risks associated with endogeneity issues. Although the instrumental variable method is used to alleviate the bidirectional causality problem, the decision of companies to “greenlight” may be driven by unobserved factors such as executive risk preferences and regional cultural characteristics. In the future, natural experimental designs need to be used to further separate causal effects.

## 7. Conclusion

Demonstrating both a short-term positive impact and a long-term inhibition, this study sheds light on explaining the dual temporal effects of ESG greenwashing on firm value. We show a contemporaneous positive relationship between ESG greenwashing and Tobin's Q, which is driven by symbolic disclosures that reduce financing constraints and attract capital inflows. However, this relation reverses over the subsequent two years, with notable declines in later periods due to reputational discounts from exposure risks and diminished innovation potential, which is reflected in reduced research and development.

Our findings support that ESG-firm value linkages are distorted by temporal frictions in stakeholder governance and signaling. Through the dynamic framework, this study adds longitudinal insights to stakeholders and signaling theories and provides regulators with useful recommendations for improving disclosure hierarchies, external verifications, and investor oversight. In the end, this promotes ESG integration for value co-creation rather than opportunistic facades.

## Reference

- Baek, S., & Lee, D. H. (2024). Can R&D investment be a key driver for sustainable development? Evidence from Korean industry. *Corporate Social Responsibility and Environmental Management*, 31(2), 838–853. <https://doi.org/10.1002/csr.2607>
- Cek, K., & Eyupoglu, S. (2020). Does environmental, social and governance performance influence economic performance? *Journal of Business Economics and Management*, 21(4), 1165–1184. <https://doi.org/10.3846/jbem.2020.12725>
- Chen, L., & Yu, H. (2022). ESG performance, financing constraints, and corporate performance. *Friends of Accounting*, (22), 24–30. DOI: N/A
- Delmas, M. A., & Burbano, V. C. (2011). The drivers of greenwashing. *California Management Review*, 54(1), 64–87. <https://doi.org/10.1525/cmr.2011.54.1.64>
- Drempetic, S., Klein, C., & Zwergel, B. (2020). The influence of firm size on the ESG score: Corporate sustainability ratings under review. *Journal of Business Ethics*, 167(2), 333–360. <https://doi.org/10.1007/s10551-019-04164-1>
- Fabisik, K., Fahlenbrach, R., Stulz, R. M., & Taillard, J. P. (2021). Why are firms with more managerial ownership worth less? *Journal of Financial Economics*, 140(3), 699–725. <https://doi.org/10.1016/j.jfineco.2021.02.001>
- Ferreira, J. J., Fernandes, C. I., Schiavone, F., & Mahto, R. V. (2023). Do ESG factors improve utilities corporate efficiency and reduce the risk perceived by credit lending institutions? An empirical analysis. *Utilities Policy*, 81, 101499. <https://doi.org/10.1016/j.jup.2023.101499>
- Garcia, A. S., & Orsato, R. J. (2020). Testing the institutional difference hypothesis: A study about environmental, social, governance, and financial performance. *Business Strategy and the Environment*, 29(8), 3261–3272. <https://doi.org/10.1002/bse.2570>
- Gao, Y., Yang, J., & Yang, Q. (2021). Corporate social responsibility and stock price crash risk: Evidence from China. *Asia-Pacific Journal of Business Administration*, 13(3), 352–370. <https://doi.org/10.1108/APJBA-09-2020-0343>
- Ghosh, S., Pareek, R., & Sahu, T. N. (2023). U-shaped relationship between environmental performance and financial performance of non-financial companies: An empirical assessment. *Corporate Social Responsibility and Environmental Management*, 30(4), 1805–1815. <https://doi.org/10.1002/csr.2449>
- Gu, L. L., Guo, J. L., & Wang, H. Y. (2020). Corporate social responsibility, financing constraints, and enterprise performance. *Finance Research*, (6), 109–127. DOI: N/A

Gutierrez-Ponce, H., & Wibowo, S. A. (2024). Do sustainability practices contribute to the financial performance of banks? An analysis of banks in Southeast Asia. *Corporate Social Responsibility and Environmental Management*, 31(2), 1418–1432.

<https://doi.org/10.1002/csr.2641>

Huang, S. Z. (2022). “Greenwashing” and “anti-greenwashing” of ESG reports. *Finance and Accounting Monthly*, (1), 3–11. <https://doi.org/10.19641/j.cnki.42-1290/f.2022.01.001>

Kim, E. H., & Lu, Y. (2011). CEO ownership, external governance, and risk-taking. *Journal of Financial Economics*, 102(2), 272–292.

<https://doi.org/10.1016/j.jfineco.2011.07.001>

Laplume, A. O., Harrison, J. S., Zhang, Z., Yu, X., & Walker, K. (2022). Evidence of an inverted U-shaped relationship between stakeholder management performance variation and firm performance. *Business Ethics Quarterly*, 32(2), 272–298.

<https://doi.org/10.1017/beq.2021.2>

Li, J. L., Yang, Z., Chen, J., & Cui, W. Q. (2021). The mechanism of ESG in promoting corporate performance: A perspective of corporate innovation. *Science of Science and Management of S&T*, 42(9), 71–89. DOI: N/A

Li, X. X., Jiang, C., Xu, Q., & Liu, J. (2024). Does environmental protection tax impact corporate ESG greenwashing? A quasi-natural experiment in China. *Economic Analysis and Policy*, 84, 774–786. <https://doi.org/10.1016/j.eap.2024.09.007>

Lyon, T. P., & Montgomery, A. W. (2015). The means and end of greenwash. *Organization & Environment*, 28(2), 223–249. <https://doi.org/10.1177/1086026615575332>

McConnell, J. J., & Servaes, H. (1990). Additional evidence on equity ownership and corporate value. *Journal of Financial Economics*, 27(2), 595–612.

[https://doi.org/10.1016/0304-405X\(90\)90069-C](https://doi.org/10.1016/0304-405X(90)90069-C)

Mervelskemper, L., & Streit, D. (2017). Enhancing market valuation of ESG performance: Is integrated reporting keeping its promise? *Business Strategy and the Environment*, 26(4), 536–549. <https://doi.org/10.1002/bse.1935>

Morck, R., Shleifer, A., & Vishny, R. W. (1988). Management ownership and market valuation: An empirical analysis. *Journal of Financial Economics*, 20, 293–315.

[https://doi.org/10.1016/0304-405X\(88\)90048-7](https://doi.org/10.1016/0304-405X(88)90048-7)

Nollet, J., Filis, G., & Mitrokostas, E. (2016). Corporate social responsibility and financial performance: A non-linear and disaggregated approach. *Economic Modelling*, 52, 400–407.

<https://doi.org/10.1016/j.econmod.2015.09.007>

- Povel, P., Singh, R., & Winton, A. (2007). Booms, busts, and fraud. *The Review of Financial Studies*, 20(4), 1219–1254. <https://doi.org/10.1093/rfs/hhm012>
- Quan, X. F., & Xiao, H. J. (2016). The motivation and effect of CSR signal transmission based on the perspective of legitimacy. *Accounting Research*, (9), 56–62. DOI: N/A
- Sun, J., & Wu, X. (2019). The impact of corporate social responsibility greenwashing on financial performance: A case study of PetroChina. *Communication of Finance and Accounting*, (22), 7–13. <https://doi.org/10.16144/j.cnki.issn1002-8072.2019.22.002>
- Sun, W., Yao, S., & Govind, R. (2019). Reexamining corporate social responsibility and shareholder value: The inverted-U-shaped relationship and the moderation of marketing capability. *Journal of Business Ethics*, 160(4), 1001–1017. <https://doi.org/10.1007/s10551-018-3854-x>
- Walker, K., & Wan, F. (2012). The harm of symbolic actions and green-washing: Corporate actions and communications on environmental performance and their financial implications. *Journal of Business Ethics*, 109(2), 227–242. <https://doi.org/10.1007/s10551-011-1122-4>
- Wang, T. Y., Winton, A., & Yu, X. (2010). Corporate fraud and business conditions: Evidence from IPOs. *The Journal of Finance*, 65(6), 2255–2292. <https://doi.org/10.1111/j.1540-6261.2010.01615.x>
- Whelan, T., Atz, U., Van Holt, T., & Clark, C. (2021). ESG and financial performance: Uncovering the relationship by aggregating evidence from 1,000 studies published between 2015–2020. *Journal of Sustainable Finance & Investment*. DOI: N/A
- Yu, E. P.-y., Luu, B. V., & Chen, C. H. (2020). Greenwashing in environmental, social and governance disclosures. *Research in International Business and Finance*, 52, 101192. <https://doi.org/10.1016/j.ribaf.2020.101192>
- Yuan, Y. H., & Xiong, X. H. (2021). Research on the relationship between ESG performance and corporate performance of listed companies: The moderating effect of ownership property. *Finance and Accounting Monthly*, (12), 3–10. DOI: N/A
- Zhou, Y., Chen, L., Zhang, Y., & Li, W. (2024). “Environmental disclosure greenwashing” and corporate value: The premium effect and premium devalue of environmental information. *Corporate Social Responsibility and Environmental Management*, 31(3), 2424–2438. <https://doi.org/10.1002/csr.2698>
- Zou, Y., & Xiao, M. (2024). Threat or shield: Environmental administrative penalties and corporate greenwashing. *Finance Research Letters*, 61, 105031. <https://doi.org/10.1016/j.frl.2024.105031>

Zou, Y. F., Qin, Z., & Zhou, J. (2024). Greenwashing and corporate performance: Evidence from Chinese listed firms. *Finance and Accounting Monthly*. DOI: N/A



## Tables and Figures

**Table 1 Summary statistics**

Table 1 reports the basic summary statistics of our sample. Panel A reports the number of observations, mean, standard deviation, minimum, and maximum value of each variable. Panel B reports the correlation matrix. The greenwashing metric, which assesses the difference between symbolic and actual ESG disclosures, is determined by subtracting the ESG performance rating from the standardized position in Bloomberg ESG disclosure ratings. Appendix 1 describes the definitions of our variables.

Panel A:

Variable Name	N	Mean	Median	SD	Min	Max
ESGg	14,118	0.001	-0.061	1.224	-2.526	3.244
Eg	14,118	0.024	-0.044	1.170	-2.815	3.289
Sg	14,118	0.043	-0.015	1.251	-2.681	4.040
Gg	14,118	-0.003	0.098	1.428	-3.203	3.972
TobinQ	14,118	1.720	1.098	1.891	0.053	10.591
SA	14,118	3.778	3.822	0.356	2.249	4.423
RDP	10,967	10.718	6.500	13.904	0.000	68.500
INV	14,116	0.825	0.643	0.820	0.056	5.992
Cert	14,117	0.030	0	0.170	0.000	1.000
GRI	14,117	0.205	0	0.404	0.000	1.000
Big4	14,117	0.153	0	0.360	0.000	1.000
Size	14,118	23.396	23.204	1.559	20.415	28.749
Lev	14,118	0.498	0.506	0.210	0.073	0.941
SOE	14,118	0.558	1.000	0.497	0.000	1.000
Dual	14,118	0.198	0.000	0.398	0.000	1.000
CR	14,118	59.667	59.890	16.245	22.990	94.330

Age	14,118	3.048	3.050	0.291	2.197	3.638
Eff	14,118	6.500	6.765	1.520	0.000	9.140
Growth	14,111	13.448	9.989	29.767	-52.722	146.823

Panel B:

	ESGg	TobinQ	SA	RDP	INV	Cert	Size
ESGg	1.000						
TobinQ	-0.074***	1.000					
SA	0.167***	0.019*	1.000				
RDP	0.153***	0.267***	0.140***	1.000			
INV	0.019	0.010	-0.175***	-0.104***	1.000		
Cert	-0.099***	0.059***	0.121***	0.009	-0.034***	1.000	
Size	0.235***	-0.463***	-0.332***	-0.078***	0.200***	-0.190***	1.000
Lev	0.146***	-0.505***	-0.119***	-0.173***	0.047***	-0.067***	0.494***
SOE	-0.007	-0.302***	-0.061***	-0.179***	0.111***	-0.019**	0.274***
Dual	0.019*	0.194***	0.004	0.131***	-0.019**	0.029***	-0.119***
CR	0.015	0.030***	-0.324***	-0.145***	0.528***	-0.077***	0.266***
Age	0.286***	-0.165***	0.670***	0.090***	-0.142***	-0.006	0.138***
Eff	-0.213***	0.068***	-0.193***	-0.027***	0.092***	-0.065***	0.153***
Growth	-0.008	0.225***	-0.081***	0.057***	0.040***	-0.019*	-0.020**
	Lev	SOE	Dual	CR	Age	Eff	Growth
Lev	1.000						
SOE	0.260***	1.000					
Dual	-0.114***	-0.298***	1.000				
CR	0.018*	0.112***	-0.028***	1.000			

Age	0.088***	0.045***	-0.040***	-0.231***	1.000		
Eff	-0.132***	0.003	0.006	0.153***	-0.119***	1.000	
Growth	-0.049***	-0.133***	0.093***	0.040***	-0.102***	0.201***	1.000

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Table 2 Greenwashing and Firm Value

This table presents estimates of fixed-effect panel regressions of Tobin's Q in relation to the Greenwashing metric and additional control variables utilised by Zou et al. (2024) and Lee & Suh (2022) from 2009 to 2023. The greenwashing metric, which assesses the difference between symbolic and actual ESG disclosures, is determined by subtracting the ESG performance rating from the standardized position in Bloomberg ESG disclosure ratings. All specifications incorporate firm and year fixed effects. Symbol \*\*\*, \*\*, and \* denote statistical significance of the corresponding coefficient at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Variable	TobinQ	TobinQ	TobinQ	TobinQ
ESGg	0.086*** (0.014)			
Eg		0.058*** (0.013)		
Sg			0.050*** (0.012)	
Gg				0.036** (0.013)
Size	-0.724*** (0.056)	-0.730*** (0.056)	-0.736*** (0.056)	-0.726*** (0.056)
Lev	-1.168** (0.205)	-1.124*** (0.205)	-1.125*** (0.205)	-1.162*** (0.206)
Dual	0.059 (0.055)	0.061 (0.055)	0.062 (0.055)	0.062 (0.055)
CR	0.015*** (0.002)	0.015*** (0.002)	0.016*** (0.002)	0.015*** (0.002)
Age	-0.071 (0.140)	0.127 (0.135)	0.158 (0.135)	0.050 (0.144)

Eff	0.035*** (0.010)	0.027*** (0.010)	0.029*** (0.010)	0.033*** (0.010)
Growth	0.004*** (0.000)	0.005*** (0.000)	0.005*** (0.000)	0.005*** (0.000)
cons	18.246*** (1.044)	17.805*** (1.029)	17.811*** (1.028)	17.930*** (1.052)
Firm FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
<i>N</i>	14,111	14,111	14,111	14,111
Pseudo R <sup>2</sup>	0.316	0.313	0.309	0.311

**Table 3 Long-term effect: Greenwashing and Firm value**

This table presents estimates of long-term fixed-effect panel regressions of Tobin's q in relation to the Greenwashing metric and additional control variables utilised by Zou et al. (2024) and Lee & Suh (2022) from 2009 to 2023. The greenwashing metric, which assesses the difference between symbolic and actual ESG disclosures, is determined by subtracting the ESG performance rating from the standardized position in Bloomberg ESG disclosure ratings. All specifications incorporate firm and year fixed effects. Symbol \*\*\*, \*\*, and \* denote statistical significance of the corresponding coefficient at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Variable	TobinQ	TobinQ	TobinQ	TobinQ
(L2) ESGg	-0.064*** (0.014)			
(L2) Eg		0.039*** (0.013)		
(L2) Sg			-0.030*** (0.014)	

(L2) Gg				-0.085*** (0.013)
Size	-0.575*** (0.063)	-0.590*** (0.062)	-0.564*** (0.063)	-0.585*** (0.063)
Lev	-1.300*** (0.229)	-1.273*** (0.222)	-1.315*** (0.230)	-1.271*** (0.228)
Dual	0.008 (0.053)	0.005 (0.051)	0.006 (0.052)	0.007 (0.052)
CR	0.015*** (0.003)	0.015*** (0.003)	0.014*** (0.003)	0.015*** (0.003)
Age	0.399** (0.161)	0.771* (0.470)	0.193 (0.146)	0.665*** (0.167)
Eff	0.025** (0.010)	0.032*** (0.010)	0.025** (0.010)	0.024** (0.010)
Growth	0.004*** (0.000)	0.004*** (0.000)	0.004*** (0.000)	0.004*** (0.000)
cons	13.414*** (1.176)	12.452*** (1.845)	13.829*** (1.192)	12.796*** (1.161)
Firm FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
<i>N</i>	11,220	11,220	11,220	11,220
Pseudo R <sup>2</sup>	0.289	0.308	0.296	0.283

**Table 4 Mechanism Explanation in the Short-Term: Financing Constraint**

This table presents the explanation of the relationship between greenwashing and firm value in the short term from the perspective of financing constraint. The greenwashing metric, which assesses the difference between symbolic and actual ESG disclosures, is determined by subtracting the ESG performance rating from the standardized position in Bloomberg ESG disclosure ratings. All specifications incorporate firm and year fixed effects. \*\*\*, \*\*, and \* denote statistical significance of the corresponding coefficient at the 1%, 5%, and 10% levels, respectively.

Variable	Current mediating effect		
	(1)	(2)	(3)
	SA	TobinQ	TobinQ
ESGg	-0.004*** (0.001)		0.091*** (0.013)
SA		-2.906*** (0.273)	-2.925*** (0.273)
RDP			
Size	-0.061*** (0.008)	-0.880*** (0.053)	-0.875*** (0.053)
Lev	-0.009 (0.018)	-1.204*** (0.186)	-1.238*** (0.185)
Dual	-0.014*** (0.005)	0.023 (0.050)	0.019 (0.050)
CR	-0.001*** (0.000)	0.013*** (0.002)	0.013*** (0.002)
Age	0.135*** (0.053)	2.245*** (0.245)	1.950*** (0.242)
Eff	0.001	0.027***	0.035***

	(0.001)	(0.010)	(0.010)
Growth	0.001**	0.005***	0.005***
	(0.000)	(0.000)	(0.000)
cons	4.618***	26.005***	26.860***
	(0.197)	(1.419)	(1.432)
Firm FE	YES	YES	YES
Year FE	YES	YES	YES
<i>N</i>	14,111	14,111	14,111
Pseudo R <sup>2</sup>	0.499	0.316	0.328



**Table 5 Mechanism Explanation in the Long-term: Research and Development**

This table presents the explanation of the relationship between greenwashing and firm value in the long term from the perspective of Research and Development. The greenwashing metric, which assesses the difference between symbolic and actual ESG disclosures, is determined by subtracting the ESG performance rating from the standardized position in Bloomberg ESG disclosure ratings. All specifications incorporate firm and year fixed effects. \*\*\*, \*\*, and \* denote statistical significance of the corresponding coefficient at the 1%, 5%, and 10% levels, respectively.

Variable	Lagged mediating effect		
	(1)	(2)	(3)
	RDP	TobinQ	TobinQ
(L2) ESGg	-0.220** (0.109)		-0.073*** (0.017)
SA			
RDP		0.013*** (0.003)	0.003*** (0.070)
Size	2.054*** (0.494)	-0.716*** (0.056)	-0.624*** (0.070)
Lev	-2.099 (1.382)	-1.084*** (0.206)	-1.179*** (0.213)
Dual	0.017 (0.417)	-0.018 (0.003)	-0.034 (0.058)
CR	-0.005 (0.020)	0.018*** (0.003)	0.016*** (0.003)
Age	22.578***	-0.031	0.380**

	(1.427)	(0.158)	(0.196)
Eff	-0.119*	0.035***	0.029***
	(0.065)	(0.011)	(0.011)
Growth	-0.001	0.006***	0.005***
	(0.003)	(0.001)	(0.001)
cons	-104.9***	17.643***	14.446***
	(9.328)	(1.061)	(1.363)
Firm FE	YES	YES	YES
Year FE	YES	YES	YES
<i>N</i>	9,074	10,964	9,074
Pseudo R <sup>2</sup>	0.253	0.352	0.300

Table 6 Moderation Effect on Institutional Ownership, Social Responsibility, ESG disclosure, and Firm Auditing

This table presents the explanation of the relationship between greenwashing and firm value in the long term. We utilize firm institutional ownership as a moderation variable for the greenwashing metric. The greenwashing metric, which assesses the difference between symbolic and actual ESG disclosures, is determined by subtracting the ESG performance rating from the standardized position in Bloomberg ESG disclosure ratings. All specifications incorporate firm and year fixed effects. \*\*\*, \*\*, and \* denote statistical significance of the corresponding coefficient at the 1%, 5%, and 10% levels, respectively.

Table 5.4 Results of moderating effect test

Variable	Current moderating effect		Lagged moderating effect	
	(1)	(2)	(3)	(4)
	TobinQ	TobinQ	TobinQ	TobinQ
(L2) ESGg	0.054*** (0.018)	-0.069*** (0.015)	-0.073*** (0.015)	-0.071*** (0.015)
L.INV	0.015 (0.020)			
ESGg*L.INV	0.034*** (0.012)			
L.Cert		-0.057 (0.052)		
L2.ESGg*L.Cert		0.041 (0.035)		
L.GRI			-0.004 (0.046)	

Variable	Current moderating effect		Lagged moderating effect	
	(1)	(2)	(3)	(4)
	TobinQ	TobinQ	TobinQ	TobinQ
L2.ESGg*L.GRI			0.084*** (0.019)	
L.Big4				-0.053 (0.136)
L2.ESGg*L.Big4				0.060*** (0.021)
Size	-0.646*** (0.065)	-0.561*** (0.067)	-0.568*** (0.068)	-0.562*** (0.067)
Lev	-1.240*** (0.228)	-1.338*** (0.242)	-1.335*** (0.241)	-1.339*** (0.242)
Dual	0.025 (0.056)	0.006 (0.055)	0.004 (0.054)	0.006 (0.055)
CR	0.014*** (0.003)	0.014*** (0.003)	0.014*** (0.003)	0.014*** (0.003)
Age	-0.038 (0.158)	0.442*** (0.172)	0.376** (0.171)	0.420** (0.172)
Eff	0.034*** (0.011)	0.025** (0.011)	0.026** (0.011)	0.026** (0.011)
Growth	0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.001)
cons	16.392*** (1.215)	13.008*** (1.239)	13.362*** (1.263)	13.104*** (1.241)

Variable	Current moderating effect	Lagged moderating effect		
	(1)	(2)	(3)	(4)
	TobinQ	TobinQ	TobinQ	TobinQ
Firm FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
N	12,215	10,785	10,785	10,785
Pseudo R <sup>2</sup>	0.307	0.288	0.292	0.288

**Table 7 Heterogeneity on Firm ownership: State-owned vs. Non-state-owned**

This table presents the explanation of the relationship between greenwashing and firm value in the long term. We split the sample based on whether the firm is owned by the state or not. The greenwashing metric, which assesses the difference between symbolic and actual ESG disclosures, is determined by subtracting the ESG performance rating from the standardized position in Bloomberg ESG disclosure ratings. All specifications incorporate firm and year fixed effects. \*\*\*, \*\*, and \* denote statistical significance of the corresponding coefficient at the 1%, 5%, and 10% levels, respectively.

	State-owned enterprise	Non-state- owned enterprises	State-owned enterprise	Non-state- owned enterprises
	(1)	(2)	(3)	(4)
Variable	TobinQ	TobinQ	TobinQ	TobinQ
ESGg	0.062*** (0.011)	0.115*** (0.029)		
L2.ESGg			-0.045*** (0.013)	-0.073*** (0.028)
Size	-0.618*** (0.064)	-0.812*** (0.085)	-0.514*** (0.071)	-0.642*** (0.099)
Lev	-1.338*** (0.225)	-0.966*** (0.362)	-1.284*** (0.240)	-1.356*** (0.444)
Dual	0.036 (0.047)	0.090 (0.096)	0.001 (0.044)	0.019 (0.094)
CR	0.009*** (0.002)	0.020*** (0.004)	0.008*** (0.002)	0.019*** (0.005)
Age	-0.201	0.119	0.270*	0.589**

	(0.138)	(0.296)	(0.163)	(0.319)
Eff	0.022***	0.064**	0.013	0.050***
	(0.009)	(0.022)	(0.009)	(0.022)
Growth	0.002***	0.007***	0.001***	0.007***
	(0.000)	(0.001)	(0.000)	(0.001)
cons	16.513***	19.395***	12.614***	14.257***
	(1.195)	(1.605)	(1.363)	(1.804)
Firm FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
N	7,881	6,230	6,447	4,773
Pseudo R <sup>2</sup>	0.335	0.286	0.314	0.272
Diff. in coefficients (p-value)	-0.053**		0.028	

**Table 8 Endogeneity test: IV approach**

This table presents estimates of fixed-effect panel regressions of Tobin's Q in relation to the Greenwashing metric and additional control variables utilised by Zou et al. (2024) and Lee & Suh (2022) from 2009 to 2023. The greenwashing metric, which assesses the difference between symbolic and actual ESG disclosures, is determined by subtracting the ESG performance rating from the standardized position in Bloomberg ESG disclosure ratings. The mean greenwashing metric of other companies in the same industry and province in the same year (ESGg\_IV) was used as the instrumental variable. All specifications incorporate firm and year fixed effects. \*\*\*, \*\*, and \* denote statistical significance of the corresponding coefficient at the 1%, 5%, and 10% levels, respectively.

**Table 5.8 Results of instrumental variable test**

Variable	Current Effect		Lagged effect	
	phase 1	phase 2	phase 1	phase 2
	(1)	(2)	(1)	(2)
	ESGg	TobinQ	L2.ESG	TobinQ
ESGg		0.366*** (0.045)		
ESGg_IV	0.405*** (0.013)			
L2.ESGg				-0.095** (0.048)
L2.ESG_IV			0.403*** (0.015)	
Kleibergen-Paap rk LM		788.86		609.39
Cragg-Donald Wald F		1085.31		835.31
Kleibergen-Paap Wald rk F		905.09		709.40



Size	0.130***	-0.459***	0.079***	-0.361***
	(0.011)	(0.019)	(0.013)	(0.019)
Lev	0.449***	-3.123***	0.412***	-2.753***
	(0.072)	(0.115)	(0.084)	(0.124)
Dual	0.084***	0.397***	0.125***	0.416***
	(0.026)	(0.046)	(0.030)	(0.050)
CR	0.003***	0.015***	0.003***	0.015***
	(0.001)	(0.001)	(0.001)	(0.001)
Age	0.500***	-0.838***	0.570***	-0.568***
	(0.045)	(0.076)	(0.054)	(0.086)
Eff	-0.145***	0.073***	-0.073***	0.014
	(0.009)	(0.014)	(0.010)	(0.013)
Growth	0.002***	0.009***	0.001	0.009***
	(0.00)	(0.001)	(0.000)	(0.001)
cons	-3.589***	15.326***	-3.155***	12.939***
	(0.399)	(0.554)	(0.450)	(0.316)
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
N	9,216	13,929	7,251	7,251
Pseudo R2	0.701	0.454	0.698	0.454

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**Table 9 Alternative construction of Firm Greenwashing**

This table presents estimates of fixed-effect panel regressions of Tobin's Q in relation to the Greenwashing metric and additional control variables utilised by Zou et al. (2024) and Lee & Suh (2022) from 2009 to 2023. The greenwashing metric, which assesses the difference between symbolic and actual ESG disclosures, is determined by subtracting the ESG performance rating from the standardized position in Bloomberg ESG disclosure ratings. For the greenwashing metric, we use the Hexun ESG rating index to replace the Huazheng ESG rating index and reconstruct it. All specifications incorporate firm and year fixed effects. \*\*\*, \*\*, and \* denote statistical significance of the corresponding coefficient at the 1%, 5%, and 10% levels, respectively.

**Table 5.7 Results of replacing independent variables**

Variable	Current Effect	Lagged effect
	(1)	(2)
	TobinQ	TobinQ
ESGghx	0.062*** (0.014)	
L2.ESGghx		-0.037*** (0.013)
Size	-0.720*** (0.073)	-0.546*** (0.089)
Lev	-1.127*** (0.240)	-1.545*** (0.280)
Dual	0.025 (0.067)	-0.038 (0.062)
CR	0.010*** (0.003)	0.008*** (0.003)
Age	0.023 (0.214)	0.392 (0.264)

Variable	Current Effect	Lagged effect
	(1)	(2)
	TobinQ	TobinQ
Eff	0.035*** (0.012)	0.035*** (0.013)
Growth	0.004*** (0.001)	0.003*** (0.001)
cons	18.131*** (1.352)	13.220*** (1.654)
Firm FE	YES	YES
Year FE	YES	YES
<i>N</i>	10,842	8,065
Pseudo R <sup>2</sup>	0.310	0.301

## Appendix 1 Variable list

Appendix 1 provides the detailed definition of the variables used in this paper.

Table 4.1 Definition and Explanation of Main Variables

Variable type	Variable	Variable Symbol	Definition
Dependent variable	Enterprise market performance	TobinQ	Total asset market value/total asset face value
Independent variables	ESG' greenwashing'	ESGg	The difference between the Bloomberg ESG rating and the Huazhong ESG rating after standardized processing
	Environmental responsibility 'greenwashing'	Eg	The difference between Bloomberg's environmental rating and Huazheng's environmental rating after standardization processing
	Social responsibility 'greenwashing'	Sg	The difference between Bloomberg's social rating and Huazheng's social rating after standardization processing
	Corporate governance 'greenwashing'	Gg	The difference between Bloomberg's corporate governance rating and Huazheng's corporate governance rating after standardized processing
Mediating variables	Financing constraints	SA	Absolute value of SA index
	Innovation capability	RDP	Annual number of R&D personnel/total number of employees in the enterprise
Moderating variables	Institutional Investor Equity Ratio	INV	At the end of the year, the total number of shares held by institutional investors divided by outstanding A-shares
	External regulatory pressure (Pre)	Cert	Has the social responsibility report of a listed company been verified by a third-party organization? 1 represents yes, otherwise it is 0

Variable type	Variable	Variable Symbol	Definition
Control variable		GRI	Does ESG disclosure follow the GRI Sustainability Reporting Guidelines? 1 represents yes, otherwise it is 0
		Big4	Is the auditor from one of the Big Four accounting firms? 1 represents yes, otherwise 0
	Enterprise size	Size	Natural logarithm of the total assets of the enterprise
	Asset liability ratio	Lev	The ratio of total liabilities to total assets of a company
	Dual employment	Dual	If the chairman and general manager are the same person, it is 1; otherwise, it is 0
	Ownership concentration	CR	The sum of the shareholding ratios of the top ten shareholders of the company
	enterprise age	Age	The natural logarithm of the difference between the statistical year of the panel data and the year of the company's establishment
	Internal controls	Eff	DiBo Internal Control Index/100
Grouping variable	Enterprise Growth	Growth	Enterprise revenue growth rate
	Id/Year	Id/Year	Dummy variable
	Enterprise nature	SOE	The value for state-owned holding enterprises is 1; otherwise, it is 0.