

Article

Can ESG Performance Promote Corporate Green Transformation? Evidence from Green OFDI in China

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Abstract: Under the pressure of the global low-carbon transition, green initiatives have gradually emerged as a critical direction for outward foreign direct investment (OFDI). In the context of China's high-level opening up, environmental, social, and governance (ESG) performance can promote sustainable development of firms. However, there is lack of research on the influence of ESG performance from the perspective of corporate green OFDI. This study examines the impact mechanism of ESG performance on corporate green OFDI in terms of its propensity and depth, using a sample of Chinese A-share listed firms from 2009 to 2023. The findings indicate that ESG performance promotes corporate green OFDI, a result that remains robust after a series of endogeneity and robustness tests. The internal mechanism analysis reveals that ESG performance enhances corporate green OFDI by reducing financing constraints and managerial myopia and by promoting risk-taking and foreign institutional investors' shareholdings. The external mechanism analysis verifies that ESG institutional constraints in the home country and ESG locational advantages in host countries strengthen the positive effect of ESG performance on corporate green OFDI. Further analysis shows that ESG performance facilitates corporate green innovation development through collaborative and independent innovation by promoting corporate green OFDI. By extending the theoretical understanding of the impact of ESG performance on the process of corporate green OFDI, this study provides strategic guidance for the sustainable development of firms in China and other similar developing countries.



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1. Introduction

With the global push for low-carbon development, nearly 150 countries have set carbon neutrality targets through legislation and policies. In this context, green OFDI has emerged as a critical direction for multinational enterprises (MNEs) [1]. Green OFDI refers to investments in sustainable projects such as clean energy (e.g., solar, wind, hydropower) and environmental protection (e.g., pollution prevention, ecological restoration) in host countries. It aligns with the goals of sustainable development and enhances the environmental performance and responsibility of investing firms [2]. Green OFDI meets both the external requirements of host countries for sustainable development and the internal needs of firms for their own sustainability. It is a practical path to promote the green transformation of Chinese firms' OFDI and supports China's goal of high-level opening

up. However, Chinese firms face significant challenges, including high demand for resources (capital, talent, information) and legitimacy issues in host countries, which create substantial outsider disadvantages for green OFDI [3,4]. Therefore, the key issue is how to promote corporate green OFDI to achieve high-level opening up and overcome the liability of foreignness. This is an important problem that needs to be addressed both academically and practically.

As the global emphasis on sustainable development intensifies, the environmental, social, and governance (ESG) framework has gained significant traction. ESG performance demands that firms integrate environmental, social, and governance factors into their strategic decision-making and transition their business models toward sustainability [5]. This aligns with the internal and external sustainability requirements of corporate OFDI. In April 2024, China's major stock exchanges (Shanghai, Shenzhen, and Beijing) issued the Guidelines on Sustainability Reporting for Listed Firms. These guidelines require firms included in key indices and those listed both domestically and internationally to disclose their 2025 annual ESG reports by 2026 at the latest. This policy underscores the growing importance of ESG principles among Chinese firms and provides a policy foundation for corporate green OFDI. At this critical juncture, as Chinese firms shift from short-term performance to long-term value creation, ESG performance plays a vital role in promoting the green transformation of OFDI. On the one hand, green OFDI typically involves longer payback periods and higher capital requirements. ESG performance can enhance a firm's reputation, strengthen relationships with key stakeholders (e.g., government, banks, suppliers, customers), and facilitate access to critical resources and policy support [6]. From a signaling perspective, strong ESG performance communicates a firm's commitment to sustainability, creating favorable conditions for green OFDI. On the other hand, strong ESG performance enhances legitimacy and helps overcome outsider disadvantages in host countries, thereby positively influencing green OFDI [7].

However, existing relevant research still exhibits some limitations. Firstly, the existing studies on the determinants of corporate green OFDI are limited, with only a few studies focusing specifically on the perspectives of geopolitical risk [2], corporate climate risk perception [8]. Research on the influence factors of corporate green OFDI from the perspective of ESG performance is lacking. Secondly, regarding the international investment effects of ESG performance on firms, current studies mainly analyze these effects from perspectives including the willingness to engage in OFDI [9], the scale of OFDI [4,10], and overseas business income [11]. Nevertheless, research on the impact mechanisms of ESG performance on corporate green OFDI remains a gap in the literature. Thirdly, concerning the measurement of corporate green OFDI, current studies mainly investigate the development of corporate green OFDI from a single dimension, such as green OFDI location choices [2] and the sectors involved [12]. However, research that characterizes the multidimensional situation of corporate green OFDI in terms of its propensity and depth is lacking. Therefore, in the context of the current internal and external sustainability requirements faced by corporate OFDI in emerging markets, this paper investigates the influence of ESG performance on corporate green OFDI and its underlying mechanisms, in order to fill the research gap in this area.

The 14th Five-Year Plan highlights technological innovation as a crucial support for green transformation, advocating for green technological innovation. However, Chinese firms still lag behind developed countries in terms of green innovation capabilities. Relying solely on internal resources makes it challenging for firms to adapt to the complex international innovation environment and achieve breakthroughs in cutting-edge technologies. Previous research has shown that green OFDI can generate reverse technology spillovers, significantly boosting corporate green innovation capabilities [12]. In the context of China's

pursuit of high-level opening up, ESG performance can potentially foster a new competitive advantage for firms in host countries, driving green innovation through green OFDI. However, the further economic consequences of ESG performance on corporate green innovation development during the green OFDI process remain inconclusive. To address this gap, this paper examines Chinese A-share listed firms from 2009 to 2023 to explore the internal and external mechanisms through which ESG performance affects corporate green OFDI and its subsequent economic consequences on corporate green innovation. The findings not only enrich the research on the economic consequences of ESG performance but also provide a theoretical foundation for firms to enhance their ESG performance in an increasingly sustainability-focused international environment. Additionally, the results encourage firms to achieve green transformation through green OFDI and offer policy support for China's high-level opening up in the direction of green OFDI.

The reasons for choosing Chinese firms as the research sample in this paper are as follows: On the one hand, China is the largest developing country in the world in terms of green OFDI. In addition, China focuses on the development of green OFDI and has already achieved remarkable results. The study of China's development of green OFDI can provide an empirical reference for other emerging developing countries. According to the 2023 Statistical Bulletin of China's Outward Foreign Direct Investment, China's OFDI in 2023 accounted for 11.4% and 6.7% of the global current year's flow and stock, respectively. And China's OFDI flow and stock both ranked third in the global ranking of countries (regions) (among which, the top two in the global rankings of OFDI flow are the United States and Japan, and the top two in the rankings of OFDI stock are the United States and the Netherlands, respectively). According to China's Outward Investment and Economic Cooperation Report 2022, Chinese firms have invested in more than 200 greenfield renewable energy projects outside China. These show that Chinese firms have achieved remarkable results and sufficient practical experience in achieving the green transformation of OFDI. Therefore, the study of Chinese firms' green OFDI can provide development experience for other emerging countries. On the other hand, despite China's rapidly growing ESG investment, this field remains in its early stage [13]. Thus, how to promote deeper development of China's ESG has become a critical issue. Chinese firms face high financing constraints and outsider disadvantages in the process of green OFDI. Strong ESG performance can alleviate the problems of financing and outsider disadvantages faced by firms to a certain extent. A deep discussion of the impact mechanism of ESG performance on corporate green OFDI can provide theoretical supports for promoting deeper development of ESG in China.

This study contributes to extant literature from the following perspectives. Firstly, we expand the research on the impact of ESG performance on firms in terms of green OFDI. While existing research on the international investment effects of ESG performance on firms has mainly focused on the willingness to engage in OFDI [9] and the scale of OFDI [10], there remains a significant gap in the literature regarding the influence of ESG performance on green OFDI in terms of its sustainable development. This study examines the propensity and depth of corporate green OFDI in light of the internal and external dual sustainable development requirements faced by corporate OFDI at present. It is found that ESG performance can promote corporate green OFDI. In contrast to prior research, this study addresses the measurement gap in existing research on corporate green OFDI by introducing a multidimensional approach to assess both the propensity and intensity of green OFDI. This methodological innovation offers new perspectives and methodological support for future research. Additionally, by extending the theoretical understanding of the liability of foreignness in the process of corporate OFDI, this study provides strategic guidance for the green transformation of firms in China and other similar developing countries.

Secondly, we explore the specific mechanisms through which ESG performance influences corporate green OFDI from both internal and external perspectives. This study reveals the internal and external influence mechanisms of ESG performance to corporate green OFDI. Based on the analysis of the internal mechanisms, it is found that ESG performance promotes corporate green OFDI by reducing financing constraints, mitigating managerial myopia, improving risk-taking and increasing foreign institutional investors' shareholdings. Based on the analysis of the external mechanisms, it is found that ESG institutional constraints in the home country and ESG locational advantages in host countries strengthen the positive effect of ESG performance on corporate green OFDI. Compared with existing research, this study not only extends the theoretical framework of long-term value creation through ESG performance from the perspective of corporate green OFDI but also provides new practical insights for China's high-level opening up.

Thirdly, based on the channel of green OFDI, we further elucidate the economic consequence of ESG performance on corporate green innovation development. The existing literature on the relationship between ESG performance and corporate green innovation primarily focuses on the correlation between the two. However, there is a relative paucity of research examining the pathways through which ESG performance influences corporate green innovation via green OFDI. It is found that ESG performance further facilitates corporate green innovation development with collaborative and independent innovation by promoting green OFDI. In contrast to existing research, this study not only elucidates the positive influence of ESG performance on corporate green innovation via the pathway of green OFDI but also offers valuable policy insights for China's green innovation transformation through high-level opening up.

The remainder of the paper is structured as follows: Section 2 provides a theoretical analysis and proposes our hypotheses. Section 3 describes the data and the model. Section 4 presents the main empirical findings. Section 5 explores the potential mechanisms. Further analysis is performed in Section 6. Finally, Section 7 concludes the paper.

2. Theoretical Analysis and Hypothesis Development

2.1. ESG Performance and Corporate Green OFDI

Green OFDI plays a significant role in promoting the internationalization of firms, yet it faces numerous challenges in its development. Green OFDI projects are typically characterized by long durations, high risks, and substantial capital investments. Moreover, firms may encounter significant foreigner disadvantages in host countries, which, to some extent, dampen their enthusiasm for advancing green OFDI. However, the sustainable development concept embedded in ESG performance can not only facilitate the green transformation of corporate business models but also signal to the outside world that firms are actively fulfilling their social responsibilities, thereby playing a positive role in the process of green OFDI. Specifically, this study analyzes the impact of ESG performance on corporate green OFDI from two dimensions: enhancing legitimacy status and creating new intangible assets advantages.

Firstly, strong ESG performance is conducive to enhancing the legitimacy status of firms in host countries, thereby facilitating the smooth implementation of green OFDI. Currently, Chinese firms investing in host countries face a series of policy constraints and the resulting foreigner disadvantages [3]. With the widespread dissemination of the sustainable development concept globally, host countries have set high environmental requirements for foreign firms' OFDI [14]. ESG performance demands that firms integrate the coordinated development of economic and social values into their strategic decision-making. By promoting the transition of corporate business models towards sustainable development, it helps enhance their sense of responsibility and international reputation

in the host country [15]. Therefore, ESG performance aligns closely with the external requirements of host countries for foreign firms to achieve green development locally. It can effectively reduce the legitimacy dilemmas and foreigner disadvantages faced by Chinese firms investing in host countries. Thus, it can be inferred that ESG performance is an important channel for firms to gain legitimacy in host countries through non-market mechanisms [7].

Secondly, strong ESG performance contributes to the establishment of novel intangible asset advantages, thereby enhancing the competitiveness of corporate green OFDI. On the one hand, according to the resource-based theory, a firm's resources encompass both tangible and intangible assets. The root of a firm's competitive advantage in green OFDI lies in whether it possesses unique resources. Strong ESG performance can signal to stakeholders such as governments and banks that the firm is actively fulfilling its social responsibilities, thereby enhancing its reputation. As a vital intangible resource of a firm, reputation enables multinational firms to gain recognition in host countries and mitigate opportunistic behaviors from potential partners, thereby enhancing corporate green OFDI [16]. On the other hand, based on the OLI theory, firms engaging in OFDI must possess three core advantages: ownership, internalization, and location [10]. Compared with conventional OFDI projects, green OFDI projects typically exhibit longer payback periods and higher technological requirements, thereby imposing stricter entry barriers for firms. Strong ESG performance helps firms optimize their relationship networks with various stakeholders, including governments, financial institutions, and supply chain partners. This enables firms to secure scarce policy support, critical resources, and collaborative opportunities [17]. Ultimately, this enhances the firm's competitiveness in the host country and creates advantageous conditions for the firm to implement green OFDI [18].

Based on the above, this study proposes the following hypothesis.

Hypothesis 1. *ESG performance can significantly promote corporate green OFDI.*

2.2. Internal Mechanisms of ESG Performance and Corporate Green OFDI

2.2.1. ESG Performance, Financing Constraints, and Corporate Green OFDI

Unlike traditional OFDI activities, green OFDI involves technological complexity and requires substantial and sustained financial investment from the outset of resource preparation to the implementation of projects [2]. For instance, when firms engage in green OFDI in the host country, they typically focus on clean energy projects (such as solar, wind, and hydropower) or environmental protection projects (such as pollution prevention and ecological restoration). The advancement of these projects necessitates not only the reservation and updating of corresponding environmental protection equipment and technologies but also the deployment of specialized talent teams. Therefore, green OFDI imposes high demands on corporate financing capabilities. However, according to the theory of liability of foreignness, multinational enterprises (MNEs) often face compounded disadvantages in the host country when promoting green OFDI activities. These disadvantages, arising from institutional differences, cultural barriers, and political risks, restrict the firms' financing activities in the host country [19]. According to statistical analysis by the Research Institute of the China Council for the Promotion of International Trade, 70% of Chinese firms primarily rely on internal funds for OFDI, while only 16% can obtain financing support in the host country. It is evident that financing constraints, as a key factor restricting firms' long-term investment decisions, have become an important prerequisite for the successful advancement of green OFDI.

Furthermore, strong ESG performance can help reduce corporate financing constraints. On the one hand, strong ESG performance can significantly reduce corporate financing

costs. Information asymmetry is one of the main reasons for the high financing costs of firms. Based on the dynamic competition theory, in a highly dynamic and uncertain market environment, firms interact through competitive behaviors to gain competitive advantages. Strong ESG performance, which encompasses data and reporting on corporate environmental performance, social responsibility, and governance practices, enhances corporate information transparency by disclosing multidimensional financial and non-financial information [20]. This helps firms build a relative information advantage within their organizations, thereby reducing their financing costs. On the other hand, strong ESG performance can effectively broaden corporate financing channels. Currently, investors and consumers are paying increasing attention to corporate sustainable development models and green products [21] and are more willing to establish long-term cooperative relationships with suppliers who are responsible to society and the environment [22]. According to the signaling theory, strong ESG performance conveys to the outside world that the firm places greater emphasis on sustainable development compared to its competitors, thus helping firms obtain more financing support from stakeholders such as investors, banks, and supply chain partners [23].

Based on the above, this study proposes the following hypothesis.

Hypothesis 2. *ESG performance can promote corporate green OFDI by reducing financing constraints.*

2.2.2. ESG Performance, Managerial Myopia, and Corporate Green OFDI

The management team, as the key implementers of a firm's day-to-day operations and future development, plays a crucial role in green OFDI [24]. However, in the fiercely competitive business environment, the capital market often evaluates firms based on short-term performance, which can lead to managerial myopia [25]. Green OFDI projects, such as the development of clean energy and the construction of environmental protection facilities, can significantly enhance a firm's environmental performance in the host country but require a longer investment horizon and higher initial costs. Moreover, the complexity of technology and sensitivity to policy associated with green OFDI present numerous challenges for firms, such as the disadvantage of being an outsider and uncertainty about future returns. Compared with shareholders, managers are more familiar with the internal operations of the firm and have the ability to influence green OFDI decisions by leveraging their information advantage. According to the upper echelons theory, managerial myopia can affect the strategic direction and investment behavior of a firm. Under intense industry competition and short-term pressure from the capital market, myopic managers tend to focus more on their short-term compensation targets, thereby prioritizing short-term financial goals over long-term sustainable development goals [26]. Therefore, in the investment decision-making process, myopic managers are likely to overlook the positive role of green OFDI in building a firm's global competitive advantage and achieving long-term sustainable development, opting instead for projects with shorter cycles and more stable returns rather than green OFDI projects [27].

However, strong ESG performance can effectively mitigate the constraints of managerial myopia on green OFDI. Strong ESG performance indicates that a firm is no longer solely pursuing economic profit growth but is shifting towards multidimensional development that includes environmental performance, social responsibility, and corporate governance. This requires a fundamental strategic adjustment from the firm, incorporating long-term, non-financial indicators such as environmental performance and social responsibility into its development plan [5]. Correspondingly, the focus of the firm's evaluation on managerial performance will also change. According to the principal-agent theory, when a firm incorporates ESG-related indicators into its evaluation system, managers are compelled to

abandon their previous investment preferences centered on stable stock prices and short-term economic profit growth. Instead, they are motivated to select investment projects that align with the firm's long-term sustainable development from the perspective of cultivating new competitive advantages [28]. Under such circumstances, managerial myopia will be effectively curbed, thereby promoting corporate green OFDI.

Based on the above, this study proposes the following hypothesis.

Hypothesis 3. *ESG performance can promote corporate green OFDI by mitigating managerial myopia.*

2.2.3. ESG Performance, Risk-Taking, and Corporate Green OFDI

Green OFDI creates opportunities for firms to expand into global markets, acquire cutting-edge technologies, and enhance profitability, while also exposing them to a variety of risks [29]. When engaging in green OFDI activities in the host country, firms inevitably face inherent risks due to the constraints of organizational legitimacy. Moreover, the implementation of green OFDI relies on multinational corporations (MNCs), and the physical distance, institutional differences, and organizational barriers between firms and MNCs further exacerbate the risks associated with green OFDI. Risk-taking reflects the price firms are willing to pay in pursuit of better performance [30]. According to the opportunity exploitation effect, the higher the risk-taking capacity of a firm, the more managers will fully exploit corporate investment opportunities, considering the long-term benefits [31]. Therefore, higher risk-taking capacity helps firms to better tolerate the expected risks of green OFDI projects and objectively compare the costs and benefits of green OFDI projects from the perspective of future sustainable development, thereby enhancing green OFDI.

Furthermore, strong ESG performance is conducive to improving corporate risk-taking capacity. Strong ESG performance indicates that firms actively fulfill their responsibilities to protect the rights and interests of stakeholders and bear external social costs [32]. Based on the signaling theory, such responsible behavior can be regarded as a positive signal sent by firms to the outside world, indicating their high level of social responsibility and sustainable development. When facing high external uncertainties, such as market fluctuations, policy changes, and social pressure, strong ESG performance enables firms to gain extensive recognition and support from stakeholders and host countries [33]. This helps firms to obtain more cooperation opportunities and key resources in times of crisis, thereby mitigating shocks and reducing risks, and ultimately enhancing their risk-taking capacity [34].

Based on the above, this study proposes the following hypothesis.

Hypothesis 4. *ESG performance can promote corporate green OFDI by improving risk-taking.*

2.2.4. ESG Performance, Foreign Institutional Investors' Shareholdings, and Corporate Green OFDI

Under the global pressure for low-carbon transformation, foreign institutional investors, as long-term holders of corporate equity, typically focus more on the potential for long-term value growth of firms. According to institutional theory, green OFDI not only meets the host country's external demands for sustainable development practices among foreign firms but is also an important pathway for firms to climb the global value chain and achieve long-term value growth [35]. In the long run, after weighing the equity returns and governance costs of green OFDI, foreign institutional investors find that green OFDI serves as an effective means to enhance the potential for corporate long-term value growth [36,37]. Moreover, with their exceptional expertise and extensive resource channels, foreign institutional investors can effectively broaden the decision-making horizons and re-

source connections of corporate investments [38]. By providing global market information, long-term investment experience, and international exchange platforms required for green OFDI, foreign institutional investors' shareholdings can effectively promote corporate green OFDI.

Furthermore, strong ESG performance is conducive to increasing foreign institutional investors' shareholdings. Against the backdrop of China's capital market openness, exemplified by the Shanghai–Shenzhen–Hong Kong Stock Connect and the inclusion of China A-shares in the MSCI Emerging Markets Index, foreign institutional investors have gradually entered China's capital market. On the one hand, developed capital markets such as the European Union and the United States have established systematic and standardized guidelines for corporate ESG information disclosure [39,40]. Based on these guidelines, foreign institutional investors may refer to the international mainstream requirements for firms' ESG performance and develop certain shareholding preferences. Therefore, strong ESG performance is conducive to increasing foreign institutional investors' shareholdings. On the other hand, due to differences in culture and legal systems as well as geographical distance, foreign institutional investors are often at an information disadvantage compared with domestic institutional investors. The multidimensional and incremental information contained in ESG performance regarding corporate internal governance and sustainable development not only helps reduce the information asymmetry between foreign institutional investors and firms but also reflects the potential for long-term value growth of firms [41]. Therefore, to reduce idiosyncratic risks of individual stocks and improve the overall returns of their investment portfolios, foreign institutional investors are more inclined to invest in firms with strong ESG performance.

Based on the above, this study proposes the following hypothesis.

Hypothesis 5. *ESG performance can promote corporate green OFDI by increasing foreign institutional investors' shareholdings.*

Our theoretical framework is clearly shown in Figure 1.



Figure 1. Theoretical framework.

3. Research Design

3.1. Sample and Data

The initial sample for this study comprises firms listed on the Shanghai and Shenzhen A-shares markets from 2009 to 2023. To ensure the robustness and reliability of the analysis, the following exclusions were applied: (1) firms under special treatment (ST/*ST); (2) firms in the financial industry, as classified by the Industry Classification Guidelines of Listed Firms revised by the China Securities Regulatory Commission in 2012; and (3) observations with missing or extreme outlier data. After these exclusions, the final sample consists of 21,846 firm-year observations.

The data used in this study are sourced from multiple channels. Data on corporate green OFDI were obtained from the China Stock Market & Accounting Research (CSMAR) Database, as well as the official websites of listed firms, and annual reports. These data were manually collated and sorted. ESG rating data were collected from Huazheng official website. Innovation data were sourced from the China Research Data Services (CNRDS) database, while managerial myopia data were obtained from the WinGo platform. Data for all other variables were downloaded from CSMAR database. To mitigate the influence of extreme values on the regression results, all continuous variables were winsorized at the 1% level.

3.2. Variable Definitions

3.2.1. Dependent Variables

Firstly, consistent with previous studies [42], this paper measures the specific situations of corporate OFDI based on data of overseas affiliated firms from CSMAR database. This is because, on the one hand, OFDI refers to the practice of multinational corporations transferring capital from the home country to the host country for physical operations using overseas management models. On the other hand, Chinese accounting standards mandate listed firms to disclose the basic information of their affiliated firms, and overseas affiliated firms are the manifestation of corporate OFDI.

Secondly, in line with the prior study [2], this paper defines green OFDI as investments by firms in the host country that focus on energy-saving and emission reduction, environmental protection, and other projects that align with sustainable goals development. This includes projects related to clean energy sources such as solar, wind, and hydropower, as well as projects related to pollution prevention and ecological restoration. To better reflect China's sustainable development goals, this paper constructs a basis for determining the scope of Chinese firms' green OFDI operations by integrating the Catalogue for Green Industries (2019 Edition) issued by the National Development and Reform Commission. The determination is based on six aspects: energy saving and environmental protection, clean production, clean energy, ecological environment, green upgrading of infrastructure, and green services. The actual business scope of overseas affiliated companies is then compared to this basis to determine whether they fall under green OFDI.

Finally, the variable of corporate green OFDI is constructed as follows:

- (1) The propensity of corporate green OFDI (Env): If the firm has green OFDI overseas affiliates in the given year, it is 1; otherwise, it is 0.
- (2) The depth of corporate green OFDI (EnvA): It is measured by the ratio of the number of corporate green OFDI overseas affiliates to their total number of overseas affiliates in the given year. Additionally, this paper measures the number of corporate green OFDI overseas affiliates in the given year (EnvB) in the robustness test.

3.2.2. Independent Variables

In benchmark regression, this paper measures corporate ESG performance based on the ESG rating compiled by the Shanghai Huazheng Index Information Service Co. Huazheng ESG ratings not only refer to the international mainstream methodology and practical experience but also incorporate more indicators that are in line with China's current stage of development, such as precision poverty alleviation and rural revitalization. Compared to foreign rating agencies, it can better reflect the actual market situation in China's local context. This paper first assigns a value of 1–9 from low to high based on the ESG rating data of Huazheng and normalizes it to measure corporate ESG performance (ESG). The range of values is (0, 1), where higher scores denote better ESG performance.

In Robustness test, this paper assigns a value of 1–9 from low to high based on the ESG rating data of Huazheng, thereby serving as a proxy variable for corporate ESG performance (ESGR).

3.2.3. Mediating Variables

(1) Financing Constraints (FC)

Consistent with previous studies [43], financing constraints are measured by the FC index, with larger values representing higher levels of corporate financing constraints.

(2) Managerial Myopia (Shorts)

Language can reflect a person's perceptions, preferences, and personality. Previous scholars have often captured human traits by analyzing the types and frequency of words used in the language of experimental subjects [44]. Based on this research paradigm, this paper first develops a 'myopia perspective' seed word set for management discussion and analysis (MD&A) based on the existing English word set and the Chinese corpus characteristics of MD&A. Subsequently, the Word2Vec machine learning technology is used to expand the seed word set with similar words. Finally, a 'short-term perspective' indicator for managers is constructed through the lexicon method. Therefore, following the method of the prior study [45], this paper constructs the managerial myopia variable, with larger values representing more managerial myopia.

(3) Risk-taking (Risktake)

Firms' investment in risky projects can reflect their level of risk-taking [46]. Thus, this paper adopts the ratio of R&D personnel to measure corporate risk-taking.

(4) Foreign Institutional Investors' Shareholdings (FII)

Drawing on the practice of previous studies [47,48], it is measured by the annual average of the ratio of foreign institutional investors' shareholdings to the firm's total equity in each quarter of the firm.

3.2.4. Control Variables

Following the previous studies [4,9,32], this paper selects the capital density (Capital), financial leverage (Lev), return on assets (Roa), firm age (Age), firm size (Size), board size (Board), firm ownership (Soe), equity concentration (Top3), and overseas business income (Overin) as control variables. In addition, to control for the influence of factors, such as time level and industry level, year-fixed effects (Year) and industry-fixed effects (Ind) are also included.

Detailed definitions of these variables are presented in Table 1.

Table 1. Definitions of variables.

Variable	The Definitions of Variables
Env	If the firm has green OFDI overseas affiliates in the given year, it is 1; otherwise, it is 0
EnvA	Percentage of green OFDI overseas affiliates of firms in the given year
EnvB	Number of green OFDI overseas affiliates of firms in the given year
ESG	Assigning values to Huazheng ESG rating results and normalization
ESGR	Assigning values to Huazheng ESG rating results
FC	Calculations based on the prior study [49]
Shorts	Calculations based on the prior study [45]
Risktake	The natural logarithm of R&D expenditure per capita
FII	Annual average of the ratio of foreign institutional investors' shareholdings to the total share capital of the firms in each quarter

Table 1. Cont.

Variable	The Definitions of Variables
Capital	Fixed assets to total assets
Lev	Total liabilities to total assets
Roa	Net profit to average total assets
Age	The natural logarithm of the sum of 1 and the difference between the current year and the year in which the firm was established
Size	The natural logarithm of the sum of 1 and total number of staff
Board	The natural logarithm of the sum of 1 and the number of board members
Soe	1 for state-owned firms holdings, 0 otherwise
Top3	Percentage of shareholding of the top three shareholders
Overin	The natural logarithm of the sum of 1 and overseas operation revenue of the firm
Year	Year dummy variables set according to the year the sample statistics belonged to
Ind	Industry dummy variables set according to the year the sample statistics belonged to

3.3. Models

3.3.1. Benchmark Model

To examine H1, the following model is used:

$$Env_{i,t+1}(EnvA_{i,t+1}) = \alpha_0 + \alpha_1 ESG_{i,t} + \sum \theta Controls_{i,t} + Year + Ind + \varepsilon_{i,t} \quad (1)$$

where the subscripts i and t indicate firm i , and year t , respectively. To reduce the possible endogeneity of ESG performance to corporate green OFDI in terms of lagged effects and mutual causality, following the previous studies [50], dependent variables are measured with $t + 1$ period data, while other variables are measured with t period data. The dependent variables are the propensity (Env) and depth (EnvA) of corporate green OFDI, respectively. The independent variable is corporate ESG performance. Controls represent the set of control variables. Year and Ind denote time fixed effects and industry fixed effects, respectively. Since the dependent variables Env and EnvA are dichotomous discrete and continuous variables, respectively, we employ panel Logit and panel OLS regressions with multidimensional fixed effects for Model (1), respectively. In addition, we adjust the standard errors for heteroskedasticity to control for unobservable individual heterogeneity and time-invariant omitted variables. If α_1 is significantly positive, it means that ESG performance promotes corporate green OFDI and H1 is verified.

3.3.2. Mediating Effect Models

To examine H2–5, following the previous studies [51], Models (2) and (3) are constructed as follows:

$$M_{i,t+1} = \beta_0 + \beta_1 ESG_{i,t} + \sum \theta Controls_{i,t} + Year + Ind + \varepsilon_{i,t} \quad (2)$$

$$Env_{i,t+1}(EnvA_{i,t+1}) = \delta_0 + \delta_1 ESG_{i,t} + \delta_2 M_{i,t+1} + \sum \theta Controls_{i,t} + Year + Ind + \varepsilon_{i,t} \quad (3)$$

where M is the mediating variable, representing the four mechanism variables of financing constraints (FC), managerial myopia (Shorts), risk-taking (Risktake), and foreign institutional investors' shareholdings (FII), respectively. The meanings of the other variables are consistent with those of Model (1). In Model (2), panel OLS regression with multidimensional fixed effects is employed as the dependent variables are all continuous. In Model (3), panel Logit and panel OLS regressions with multidimensional fixed effects are employed since the dependent variables Env and EnvA are binary discrete and continuous variables, respectively. In addition, we adjust the standard errors for heteroskedasticity to control for unobservable individual heterogeneity and time-invariant omitted variables.

If β_1 is significantly negative, negative, positive, and positive, respectively, it means that ESG performance reduces financing constraints, mitigates managerial myopia, improves risk-taking, and increases foreign institutional investors' shareholdings. Further, if δ_2 is significantly negative, negative, positive, and positive, respectively, it represents that ESG performance can promote corporate green OFDI by reducing financing constraints, mitigating managerial myopia, improving risk-taking, and increasing foreign institutional investors' shareholdings, thereby validating H2 to H5.

4. Empirical Results

4.1. Descriptive Statistics

The descriptive statistics for the main variables are reported in Table 2. Regarding the dependent variable, the mean value of Env_{t+1} is 0.027, indicating that 2.7% of the firms have engaged in green OFDI. As for the independent variable, the mean value of ESG is 0.509, suggesting that the ESG performance of China's listed firms has room for further improvement.

Table 2. Descriptive statistics.

Variable	N	Mean	Median	SD	Min	Max
Env_{t+1}	21,846	0.027	0.000	0.163	0.000	1.000
$EnvA_{t+1}$	21,846	0.072	0.000	1.011	0.000	85.000
ESG	21,846	0.509	0.500	0.182	0.000	1.000
Capital	21,846	0.235	0.202	0.170	0.000	0.954
Lev	21,846	0.459	0.458	0.201	0.059	0.925
Roa	21,846	0.038	0.035	0.056	−0.230	0.201
Age	21,846	2.906	2.944	0.336	1.792	3.555
Size	21,846	7.878	7.835	1.314	2.079	13.223
Board	21,846	2.263	2.303	0.174	1.792	2.773
Soe	21,846	0.470	0.000	0.499	0.000	1.000
Top3	21,846	49.765	49.273	15.802	3.093	98.290
Overin	21,846	11.526	17.376	9.735	0.000	26.539

Additionally, it is important to highlight that firm size can determine the quality of ESG reporting, as evidenced by several studies. In particular, ESG ratings for smaller firms may not fully reflect their true ESG performance. This study provides a descriptive statistical analysis of the sample firms' size based on two dimensions: firm age (Age) and the number of employees (Size). The mean and median of Age are 2.906 and 2.944, respectively, corresponding to an average and median establishment age of 17.28 and 18 years. Meanwhile, the mean and median of Size, measured by the number of employees, are 7.878 and 7.835, respectively, showing an average and median number of employees of 2635.47 and 2499. These results suggest that the sample firms, which are A-share listed firms in China, generally have a relatively large firm size. Therefore, their ESG ratings can reasonably reflect the true circumstances of corporate sustainable development. The results of other control variables are consistent with the findings of previous studies.

4.2. Correlation Analysis

The correlation matrix is presented in Table 3, with Pearson correlation coefficients at the top right. The correlation coefficients between the dependent variable and the control variables, between the independent variable and the control variables, and among the control variables themselves are all less than 0.5. Therefore, it can be inferred that this study does not exhibit multicollinearity. In addition, the correlation coefficients between

the independent variable (ESG) and the dependent variables ($Env_{t+1}/EnvA_{t+1}$) are all significantly positive, providing preliminary empirical evidence to support H1.

Table 3. Correlation matrix.

Variable	Env_{t+1}	$EnvA_{t+1}$	ESG	Capital	Lev	Roa	Age	Size	Board	Soe	Top3	Overin
Env_{t+1}	1.000											
$EnvA_{t+1}$	0.424 ***	1.000										
ESG	0.043 ***	0.014 **	1.000									
Capital	0.023 ***	0.010	−0.044 ***	1.000								
Lev	0.056 ***	0.031 ***	−0.015 **	0.038 ***	1.000							
Roa	−0.014 **	−0.005	0.194 ***	−0.085 ***	−0.369 ***	1.000						
Age	−0.007	0.017 **	−0.121 ***	−0.053 ***	0.104 ***	−0.086 ***	1.000					
Size	0.045 ***	0.033 ***	0.177 ***	0.186 ***	0.284 ***	0.063 ***	−0.021 ***	1.000				
Board	0.024 ***	0.008	0.057 ***	0.152 ***	0.133 ***	0.011 *	−0.022 ***	0.222 ***	1.000			
Soe	−0.016 **	−0.023 ***	0.112 ***	0.171 ***	0.277 ***	−0.115 ***	0.111 ***	0.195 ***	0.258 ***	1.000		
Top3	0.018 ***	−0.003	0.098 ***	0.061 ***	−0.018 ***	0.167 ***	−0.171 ***	0.199 ***	0.034 ***	0.078 ***	1.000	
Overin	0.081 ***	0.046 ***	0.034 ***	−0.004	−0.017 **	0.016 **	−0.076 ***	0.256 ***	−0.033 ***	−0.139 ***	−0.010	1.000

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

4.3. Benchmark Regression Results

Table 4 presents the benchmark regression results of ESG performance on corporate green OFDI. The estimated coefficients for ESG are all significantly positive, suggesting that ESG performance can significantly promote corporate green OFDI. Therefore, H1 is validated.

Table 4. Benchmark regression results.

Variable	(1)	(2)
	Env_{t+1}	$EnvA_{t+1}$
ESG	1.986 *** (7.145)	0.021 *** (5.389)
Controls	Yes	Yes
Year/Ind	Yes	Yes
Wald Chi ²	707.868	
Pseudo R ² /R ²	0.156	0.033
N	21,846	21,846

Note: *** indicate statistical significance at the 1% levels. In parentheses are T-values/Z-values; due to space constraints, the results of regressions with control variables and fixed effects are not reported, as below.

Considering the significance of R² in evaluating regression results, we observe that the Pseudo R² and R² values for the model presented in this study are 0.156 and 0.033, respectively, which are consistent with those reported in previous studies [4,32]. The relatively low R² values may primarily stem from the limited number of non-zero values of the dependent variable in this study. This characteristic of the dependent variable indirectly contributes to the objectively lower R² value observed. Additionally, the relatively low R² value may also be associated with several other factors, including model specification (e.g., omitted variables), data quality (e.g., sample selection bias), and the characteristics of the dependent variable (e.g., its range or distribution). To address these concerns and enhance the robustness of our regression results, we subsequently conducted a series of endogeneity and robustness tests.

4.4. Endogeneity and Robustness Tests

4.4.1. IV-2SLS Test

To address the potential endogeneity issues arising from the bidirectional causal relationship between ESG performance and corporate green OFDI, as well as the omitted variable bias, we select appropriate instrumental variables and conduct IV-2SLS test. Consistent with previous studies [1,52], we take ESG-themed public offering of funds as

exogenous events and measure the number (sumNS) and the number (FQ) of firms held by ESG funds in a given year as instrumental variables for corporate ESG performance, respectively. On the one hand, ESG funds play an active role in improving ESG performance by ‘voting with their feet’ [53]. Therefore, the instrumental variables satisfy the correlation condition. On the other hand, the establishment and size of ESG funds are determined by fund firms, and the portfolio and changes in the holdings of ESG funds are determined by the fund managers. Therefore, the instrumental variables do not have a direct impact on corporate green OFDI, satisfying the exogeneity condition.

The regression results of the IV-2SLS test are presented in Table 5. Columns (1) and (4) display the results of the first stage, where the estimated coefficients of sumNS and FQ are both significantly positive, indicating that the instrumental variables meet the relevance criterion. Additionally, the AR and Wald tests both pass the *p*-value significance level test, illustrating that the instrumental variables do not suffer from the problem of weak instrumental variables. Columns (2), (3), (5), and (6) present the results of the second stage. The estimated coefficients of ESG remain significantly positive, indicating that the findings remain robust.

Table 5. Results of the IV-2SLS test.

Variable	The Instrumental Variables = sumNS			The Instrumental Variables = FQ		
	(1) ESG	(2) Env _{t+1}	(3) EnvA _{t+1}	(4) ESG	(5) Env _{t+1}	(6) EnvA _{t+1}
ESG		5.420 *** (15.034)	0.547 *** (4.097)		5.075 *** (21.224)	0.546 *** (6.745)
sumNS	0.148 *** (7.152)					
FQ				0.005 *** (12.245)		
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year/Ind	Yes	Yes	Yes	Yes	Yes	Yes
Wald Chi ²		3344.942	198.337		2507.751	208.278
Pseudo R /R ²	0.206			0.212		
AR value		48.250	32.720		121.670	54.230
[<i>p</i> value]		(0.000)	(0.000)		(0.000)	(0.000)
Wald value		29.960	16.790		84.750	45.500
[<i>p</i> value]		(0.000)	(0.000)		(0.000)	(0.000)
N	21,846	21,846	21,846	21,846	21,846	21,846

Note: *** indicate statistical significance at the 1% levels.

4.4.2. PSM Test

To mitigate the potential influence of selection bias on the regression results, we employ propensity score matching (PSM) test following the approach of prior studies [10]. Specifically, we first construct a dummy variable for the independent variable (ESG) based on the annual average ESG score of firms. Firms with ESG scores above the annual average are assigned a value of 1 and classified as the treatment group, while those with scores below or equal to the average are assigned a value of 0 and classified as the control group. Secondly, we conduct a 1:1 nearest-neighbor matching with a caliper distance of 0.05 to select appropriate control group samples for the treatment group. Finally, Model (1) is re-estimated based on the PSM sample. As shown in Columns (1) and (2) of Table 6, the estimated coefficients of ESG remain significantly positive, suggesting the findings are robust.

Table 6. Results of the PSM test.

Variable	(1)	(2)
	Env _{t+1}	EnvA _{t+1}
ESG	1.839 *** (4.744)	0.019 *** (3.603)
Controls	Yes	Yes
Year/Ind	Yes	Yes
Wald Chi ²	397.527	
Pseudo R/R ²	0.166	0.042
N	11,376	11,376

Note: *** indicate statistical significance at the 1% levels.

4.4.3. Alternative Measurement for ESG Performance

To avoid potential biases in the results arising from the measurement of ESG performance, we change the measurement method of the independent variable. Specifically, this paper assigns a value of 1–9 from low to high to the ESG rating results from Huazheng as an independent variable (ESGR) and re-estimate Model (1). As shown in Columns (1) and (2) of Table 7, the estimated coefficients of ESGR remain significantly positive, suggesting the findings are robust.

Table 7. Results of the robustness tests.

Variable	(1) Env _{t+1}	(2) EnvA _{t+1}	(3) EnvB _{t+1}	(4) Env _{t+2}	(5) EnvA _{t+2}	(6) Env _{t+1}	(7) EnvA _{t+1}	(8) Env _{t+1}	(9) EnvA _{t+1}
ESG			0.104 *** (3.635)	2.034 *** (6.944)	0.020 *** (4.899)	1.759 *** (6.369)	0.019 *** (4.924)	1.986 *** (3.987)	0.021 *** (2.963)
ESGR	0.317 *** (7.208)	0.003 *** (5.467)							
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year/Ind	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province						Yes	Yes		
Wald Chi ²	710.700			616.589		817.909		236.367	
Pseudo R ² /R ²	0.156	0.033	0.037	0.156	0.031	0.182	0.043	0.156	0.033
N	21,846	21,846	21,846	19,375	19,375	19,266	21,846	21,846	2,1846

Note: *** indicate statistical significance at the 1% levels. Sample size reductions in Columns (4) and (5) are due to lagging the dependent variables by two periods, while the sample size reduction in Column (6) is due to the inclusion of province fixed effects.

4.4.4. Alternative Measurement for Corporate Green OFDI

To avoid potential biases in the results arising from the measurement of corporate green OFDI, we use the number of overseas affiliates (EnvB) of corporate green OFDI in the given year as a dependent variable and re-estimate Model (1). As shown in Column (3) of Table 7, the estimated coefficient of ESG remains significantly positive, indicating that the findings are robust.

4.4.5. Considering Lag Effects

Given that the impact of ESG performance on corporate green OFDI may exhibit a lagged effect, we employ the dependent variable data lagged by two periods to measure corporate green OFDI and re-estimate Model (1). As shown in Columns (4) and (5) of Table 7, the estimated coefficients of ESG remain significantly positive, revealing the results are robust.

4.4.6. Controlling for Province Fixed Effects

To mitigate the potential estimation bias caused by unobservable factors at the provincial level that may serve as omitted variables, province-fixed effects (Province) are incorporated into the regression analysis. As shown in Columns (6) and (7) of Table 7, the estimated coefficients of ESG remain significantly positive, suggesting the findings are robust.

4.4.7. Adoption of Firm-Level Clustering Adjustment for Standard Errors

To further control for individual fixed effects and potential heteroscedasticity at the firm level, we employ clustered standard errors at the firm level and re-estimates Model (1). As shown in Columns (8) and (9) of Table 7, the estimated coefficients of ESG remain significantly positive, indicating that the findings are robust.

5. Mechanism Analysis

The previous benchmark regression results have verified that ESG performance can promote corporate green OFDI. Therefore, this paper further develops the mediating effect test based on Models (2) and (3) and explores the internal mechanisms of ESG performance in promoting corporate green OFDI from the perspectives of financing constraints, managerial myopia, risk-taking, and foreign institutional investors' shareholdings.

5.1. Internal Mechanism Analysis

5.1.1. Financing Constraints

As shown in Column (1) of Table 8, the estimated coefficient of ESG is significantly negative, indicating that ESG performance significantly reduces financing constraints. Further, as shown in Columns (2) and (3) of Table 8, the estimated coefficients of FC are significantly negative, illustrating that financing constraints play a significant mediating effect. To sum up, ESG performance can promote corporate green OFDI by reducing financing constraints, thereby validating H2.

Table 8. Results on the mediating effect of financing constraints and managerial myopia.

Variable	(1) FC _{t+1}	(2) Env _{t+1}	(3) EnvA _{t+1}	(4) Shorts _{t+1}	(5) Env _{t+1}	(6) EnvA _{t+1}
ESG	−0.050 *** (−6.552)	1.899 *** (6.870)	0.099 *** (3.423)	−0.005 * (−1.665)	2.087 *** (7.509)	0.023 *** (5.741)
FC		−2.643 *** (−9.884)	−0.146 *** (−4.695)			
Shorts					−0.875 (−1.435)	−0.018 *** (−2.667)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year/Ind	Yes	Yes	Yes	Yes	Yes	Yes
Wald Chi ²		722.691			696.719	
Pseudo R ² /R ²	0.585	0.175	0.038	0.117	0.155	0.033
N	21,508	21,508	21,508	21,151	21,151	21,151

Note: *** and * indicate statistical significance at the 1% and 10% levels, respectively. The reduced sample size is due to missing data for the mediating variable component.

5.1.2. Managerial Myopia

As shown in Column (4) of Table 8, the estimated coefficient of ESG is significantly negative, indicating that ESG performance significantly mitigates managerial myopia. Further, as shown in Columns (5) and (6) of Table 8, the estimated coefficients of Shorts are significantly negative, suggesting that managerial myopia plays a significant mediating

role. Conclusively, ESG performance can promote corporate green OFDI by mitigating managerial myopia, thereby validating H3.

5.1.3. Risk-Taking

As shown in Column (1) of Table 9, the estimated coefficient of ESG is significantly positive, indicating that ESG performance significantly improves risk-taking. Furthermore, as shown in Columns (2) and (3) of Table 9, the estimated coefficients of Risktake are significantly positive, illustrating that risk-taking plays a significant mediating effect. In other words, ESG performance can promote corporate green OFDI by improving risk-taking, thereby validating H4.

Table 9. Results on the mediating effect of risk-taking and foreign institutional investors' shareholdings.

Variable	(1) Risktake _{t+1}	(2) Env _{t+1}	(3) EnvA _{t+1}	(4) FII _{t+1}	(5) Env _{t+1}	(6) EnvA _{t+1}
ESG	1.505 *** (12.267)	1.738 *** (6.233)	0.018 *** (4.693)	0.013 *** (2.930)	1.990 *** (7.165)	0.021 *** (5.366)
Risktake		0.193 *** (7.825)	0.002 *** (8.732)			
FII					0.712 * (1.949)	0.007 * (1.824)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year/Ind	Yes	Yes	Yes	Yes	Yes	Yes
Wald Chi ²		687.717			710.584	
Pseudo R ² /R ²	0.513	0.174	0.037	0.141	0.157	0.033
N	21,846	21,846	21,846	21,846	21,846	21,846

Note: *** and * indicate statistical significance at the 1% and 10% levels, respectively.

5.1.4. Foreign Institutional Investors' Shareholdings

As shown in Column (4) of Table 9, the estimated coefficient of ESG is significantly positive, indicating that ESG performance significantly increases foreign institutional investors' shareholdings. Further, as shown in Columns (5) and (6) of Table 9, the estimated coefficients of FII are significantly positive, indicating that foreign institutional investors' shareholdings play a significant mediating role. Overall, ESG performance can promote corporate green OFDI by increasing foreign institutional investors' shareholdings, thereby validating H5.

5.2. External Mechanism Analysis

The home and host countries can influence the signaling and competitive advantage construction of corporate ESG performance. These factors, in turn, affect the positive impact of ESG performance on corporate green OFDI. Based on this, this paper analyzes the external influence mechanisms of ESG performance on corporate green OFDI from two aspects: ESG institutional constraints in the home country and ESG locational advantage in host countries.

5.2.1. ESG Institutional Constraints in the Home Country

As the firms' stakeholder and regulator, the home government can urge firms to improve their ESG performance by formulating a series of firms' ESG-related policies [54]. Currently, the Chinese government has not issued any mandatory ESG-related policies for firms. However, the State-owned Assets Supervision and Administration Commission of the State Council (SASAC) issued the Work Program for Improving the Quality of Listed Firms Held by Central Firms in 2022. It requires listed firms controlled by central

state-owned enterprises to achieve full coverage of ESG-specific report disclosure by 2023. In this context, these firms are subject to higher ESG institutional constraints, which can constitute mandatory hard market regulation of corporate ESG performance and strengthen the signaling role of their ESG performance [35]. Therefore, ESG institutional constraints may influence the role of ESG performance in promoting corporate green OFDI.

Specifically, this paper measures a firm's ESG institutional constraints in its home country (Sup) by whether the firm is a central SOE-controlled listed company. Then, the interaction item ($ESG \times Sup$) and ESG institutional constraints (Sup) are included in Model (1) for analysis. The results are shown in Column (1) of Table 10, and the estimated coefficient of $ESG \times Sup$ is significantly positive. This suggests that ESG institutional constraints strengthen the signaling effect of corporate ESG performance, thus reinforcing the positive effect of ESG performance on corporate green OFDI.

Table 10. Results of the external mechanisms analysis.

Variable	(1)	(2)
	Env_{t+1}	Env_{t+1}
$ESG \times Sup$	2.988 *** (3.882)	
$ESG \times Adlocation$		2.256 *** (4.309)
ESG	1.524 *** (5.305)	1.104 *** (3.296)
Sup	−1.380 *** (−2.806)	
Adlocation		−2.641 *** (−8.312)
Controls	Yes	Yes
Year/Ind	Yes	Yes
Wald Chi2	708.865	732.307
Pseudo R ²	0.161	0.193
N	21,846	21,846

Note: *** indicate statistical significance at the 1% levels. Due to space limitations, the paper only presents the regression results with *Env* as the dependent variable.

5.2.2. ESG Locational Advantage in Host Countries

Different host countries have varying ESG requirements due to differing levels of economic development. Developed capital markets, such as those in the European Union and the United States, have established systematic and standardized guidelines for firms' ESG disclosure and practice through mandatory government policies or market self-regulation. As a result, the application of ESG concepts among listed firms in developed capital markets is more common and mature [40]. In contrast, developing countries have lower ESG requirements for firms. Strong ESG performance in Chinese firms can help mitigate the outsider disadvantages faced by corporate green OFDI in host countries, thereby constituting an ESG locational advantage for firms in host countries [55]. Therefore, ESG locational advantages in host countries may influence the role of ESG performance in promoting corporate green OFDI.

Specifically, this paper measures a firm's ESG locational advantage in host countries (Adlocation) by whether a firm's OFDI country is a developing country. Then, the interaction item ($ESG \times Adlocation$) and ESG locational advantage in host countries (Adlocation) are included in Model (1) for analysis. The results are shown in Column (2) of Table 10, and the estimated coefficient of $ESG \times Adlocation$ is significantly positive. This indicates that the ESG locational advantage in host countries further highlights the intangible asset

advantage brought by strong ESG performance to firms and reduces the outsider disadvantages faced by corporate green OFDI. Therefore, ESG locational advantage in host countries can reinforce the positive effect of ESG performance on corporate green OFDI.

6. Further Analysis: From the Perspective of Corporate Green Innovation

Previous research has verified the positive effect of ESG performance on corporate green OFDI. Therefore, this paper further examines the economic impact of ESG performance on corporate green innovation development, considering green OFDI as the underlying mechanism. Drawing on previous studies, this paper categorizes corporate green innovation into green independent innovation and green collaborative innovation based on different innovation modes [56,57]. Specifically, green collaborative innovation is measured by the natural logarithm of 1 plus the number of green patents jointly filed by listed firms and their subsidiaries (Gre_co_{t+2}). Green independent innovation is measured by the natural logarithm of 1 plus the number of green patents filed independently by listed firms and their subsidiaries (Gre_in_{t+2}). The model is constructed as follows:

$$Gre_co_{i,t+2}(Gre_in_{t+2}) = \zeta_0 + \zeta_1 ESG_{i,t} \times Env_{i,t+1} + \zeta_2 ESG_{i,t} + \zeta_3 Env_{i,t+1} + \sum \theta Controls_{i,t} + Year + Ind + \varepsilon_{i,t} \quad (4)$$

where dependent variables $Gre_co_{i,t+2}$ and $Gre_in_{i,t+2}$ represent green collaborative innovation and green independent innovation of firm i in year $t+2$, respectively. $ESG_{i,t} \times Env_{i,t+1}$ represents the interaction item between ESG performance and green OFDI. The other variables are consistent with the benchmark regression. Since the dependent variables are all continuous, we employ panel OLS regression with multidimensional fixed effects and adjust the standard errors for heteroskedasticity to enhance the accuracy and robustness of the estimation results.

The results are showed in Table 11, and the estimated coefficients of $ESG \times Env_{t+1}$ are both significantly positive. These suggest that ESG performance further facilitates green innovation development through both collaborative and independent innovation by promoting corporate green OFDI.

Table 11. Results of further analysis from the perspective of green innovation.

Variable	(1) Gre_co_{t+2}	(2) Gre_in_{t+2}
$ESG \times Env_{t+1}$	0.642 ** (2.248)	1.215 *** (3.748)
Env_{t+1}	0.092 (0.580)	0.200 (1.049)
ESG	0.331 *** (10.677)	0.494 *** (11.114)
Controls	Yes	Yes
Year/Ind	Yes	Yes
F	102.515	291.388
R ²	0.175	0.288
N	18,774	18,774

Note: *** and ** indicate statistical significance at the 1% and 5% levels, respectively. The reduced sample size is due to taking the dependent variable with a two-period lag.

7. Conclusions, Implications and Limitations

7.1. Conclusions

In the context of China's high-level opening up, ESG performance plays an important role in facilitating corporate green transformation during the process of OFDI. However,

there is a lack of research exploring the impact of ESG performance on corporate green OFDI. The existing studies on the determinants of corporate green OFDI are limited, with only a few studies focusing specifically on the perspectives of geopolitical risk [2] and corporate climate risk perception [8]. Moreover, concerning the measurement of corporate green OFDI, current studies mainly investigate the development of corporate green OFDI from a single dimension, including green OFDI location choices [2] and the sectors involved [12]. Therefore, this paper introduces a multidimensional approach to assess both the propensity and intensity of corporate green OFDI. In light of the internal and external dual sustainable development requirements faced by corporate OFDI, this paper provides theoretical and empirical support for the impact and internal mechanisms of ESG performance on corporate green OFDI. It also examines the external influence mechanisms of ESG performance on corporate green OFDI from two perspectives: ESG institutional constraints in the home country and ESG locational advantage in host countries. Considering green OFDI as the underlying mechanism, this paper further analyzes the economic impact of ESG performance on corporate green innovation development from the perspectives of green independent innovation and green collaborative innovation.

Taking Chinese A-listed firms from 2009 to 2023 as the sample, the results indicate that ESG performance promotes corporate green OFDI. This finding remains robust after a series of endogeneity and robustness tests. The internal mechanism analysis reveals that ESG performance enhances corporate green OFDI by reducing financing constraints and managerial myopia, and by increasing risk-taking and foreign institutional investors' shareholdings. The external mechanism analysis verifies that ESG institutional constraints in the home country and ESG locational advantages in host countries strengthen the positive effect of ESG performance on corporate green OFDI. Further analysis shows that ESG performance facilitates corporate green innovation development through both collaborative and independent innovation by promoting corporate green OFDI. In other words, green OFDI is an important channel for firms to achieve green transformation through ESG performance. Conclusively, these results not only extend the theoretical framework of long-term value creation through corporate ESG performance from the perspective of green OFDI but also provide strategic guidance for the sustainable development of firms in China and other similar developing countries.

7.2. Implications

Based on the above analyses, this paper offers the following implications: First, firms should optimize their internal governance mechanisms to motivate their engagement in green OFDI projects. The findings of the internal mechanisms indicate that managerial myopia and corporate risk-taking are key pathways through which ESG performance affects green OFDI. Therefore, on the one hand, firms should link managerial compensation assessments to ESG performance to mitigate managerial myopia. For instance, the vesting conditions of managerial equity incentives could be tied to ESG performance targets over a 3-to-5-year period (such as carbon compliance rates for overseas projects and coverage rates of environmental certifications). Full vesting would be granted upon achievement of these targets, with proportional reductions applied otherwise, thereby extending the managerial long-term decision-making horizon. On the other hand, firms should establish a Strategic and ESG Committee to incorporate ESG performance into long-term strategic planning, thereby enhancing their risk-taking capacity. Specifically, this could involve setting phased carbon reduction targets in strategic planning and improving the social responsibility audit system for the supply chain. By linking economic profit growth to environmental performance and social responsibility, firms can gradually strengthen their risk-taking capacity within the framework of sustainable development.

Second, the collaboration mechanisms among stakeholders should be strengthened to improve the external conditions for corporate green OFDI projects. The findings of the internal mechanisms show that stakeholders of a firm can significantly influence the process of ESG-driven green OFDI through financing and shareholding. Therefore, on the one hand, financial institutions, as important stakeholders of firms, should increase the correlation between lending tools and corporate ESG performance, steering funds towards firms with better ESG performance to alleviate corporate financing constraints. For example, lending tools linked to corporate ESG performance could be introduced, with interest rates adjusted according to annual ESG performance. On the other hand, relevant departments should continue to deepen the high-level opening up of China's capital market to attract foreign institutional investors. Specifically, regular communication mechanisms with MSCI should be established to expand the scope of Chinese A-listed firms included in the MSCI index, thereby gaining recognition from foreign institutional investors for Chinese A-listed firms. Meanwhile, the trading mechanism of the Shanghai–Shenzhen–Hong Kong Stock Connect should be continuously improved to facilitate foreign institutional investors investing in Chinese A-listed firms.

Third, the ESG system of China's capital market should be perfected, and the government's policy-guiding role in enhancing corporate ESG performance should be strengthened. The external influence mechanism indicates that the government plays an important role in improving corporate ESG performance. Therefore, on the one hand, relevant government departments should, based on the theoretical connotation of China's sustainable development and the stage of high-level opening up, improve the policy-regulatory framework for corporate ESG performance, enhance regulatory enforcement, and establish corresponding incentive mechanisms. For example, firms with strong ESG performance could be incentivized through tax reduction or tax exemption policies, lower loan interest rates, and priority consideration for bidding participation. This would expand the coverage and regulatory effectiveness of China's ESG-related policies. On the other hand, the government should refer to international ESG disclosure standards to improve the norms and quality of corporate ESG information disclosure. For example, the Global Reporting Initiative (GRI) guidelines and the Task Force on Climate-related Financial Disclosures (TCFD) framework could be referenced to establish a corporate ESG information disclosure system that is in line with international standards. This would enhance the ESG locational advantages of Chinese firms in host countries.

7.3. Limitations and Future Recommendations

Our study has several limitations that indicate areas in which future research could contribute. First, we examined the impact of ESG performance on the propensity and depth of corporate green OFDI. However, we observe that the R^2 values for the model presented in this study are relatively low, which is consistent with those reported in previous studies [4,32]. The relatively low R^2 value may be primarily attributed to the low proportion of sample firms engaging in green OFDI. This situation further leads to a limited number of non-zero values of the dependent variable, which indirectly contributes to the lower R^2 value observed. Therefore, future research can improve this issue by constructing variables related to corporate green OFDI using other methods. Second, we examined only Chinese A-listed firms, due to limited data availability. This may also potentially account for the relatively high frequency of zero values in the dependent variable among firms, which indirectly leads to the lower R^2 value. Therefore, future research can expand the sample range through field surveys, questionnaires, and other scientific methods, thereby alleviating the issue of low R^2 values in regression results due to sample selection.

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Abbreviations

The following abbreviations are used in this manuscript:

ESG	Environmental, social, and governance
OFDI	Outward foreign direct investment
GRI	Global Reporting Initiative
SASAC	State-owned Assets Supervision and Administration Commission of the State Council
TCFD	Task Force on Climate-related Financial Disclosures
FII	Foreign institutional investors
OLS	Ordinary least squares
MD&A	Management discussion and analysis

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