

# ESG Ratings and Outward FDI: Financing, Industrial Upgrading, and Digital Trade in Chinese Enterprises

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**Abstract.** As the concept of sustainable development continues to spread, ESG-related research is a hot topic in current academic research. However, there is a relative lack of research exploring the ESG of Chinese enterprises on the scale of outward foreign direct investment (OFDI). This paper adopts an OLS regression model to study the relevant impact of enterprises' ESG ratings on the scale of outward foreign direct investment (OFDI). The results show that: enterprises with higher ESG ratings are more likely to utilize their ESG advantages to alleviate financing constraints, promote industrial upgrading, and improve industrial resilience and thus have a larger OFDI scale; This study provides new perspectives and feasible solutions for Chinese enterprises to further expand the scale of OFDI.

**Keywords:** ESG, OFDI, financing constraints, industrial upgrading, industrial resilience.

## 1. Introduction

The scale of China's outward foreign direct investment (OFDI) has been growing rapidly since the 21st century, but enterprises face adaptation problems in overseas markets due to the lack of ESG (Environmental, Social and Governance) governance, and there is an urgent need to clarify the role of ESG on OFDI from the theoretical level. Existing studies have explored OFDI drivers from the perspectives of financing constraints, industrial structure upgrading and industry chain resilience, but there are still significant limitations.

First, studies from the perspective of financing constraints focus on the direct effects of traditional financial indicators and ignore the indirect mechanism of ESG. For example, Huang & Zhang find that lower financing constraints increase the probability of OFDI [1], but their model does not incorporate ESG indicators and fails to reveal how ESG reduces the cost of debt through improving the quality of information disclosure [2], thus alleviating the financing constraints. Cheng suggests that financing constraints promote OFDI by lowering the host country's perception of risk, but fails to explain how ESG practices enhance international investors' trust through the fulfillment of social responsibility, thus reducing financing frictions [3]. How ESG practices enhance international investor trust through social responsibility fulfillment and thus reduce financing frictions. While most of these studies are based on developed country samples, Chinese firms may face more complex ESG-financing interactions due to differences in institutional contexts [4], which are not sufficiently explained by existing theories.

Second, industrial structure upgrading research lacks an analysis of the micro-path of ESG-driven technological innovation. Hidalgo et al. suggest that industrial structural upgrading drives OFDI's transition to technology-seeking [5], but fail to clarify how ESG reshapes firms' strategic objectives through green technology R&D [6], which in turn influences OFDI decision-making. UNCTAD points out that industrial upgrading relies on the integration of global technology chains, but fails to discuss how ESG accelerates technology spillovers through digital platforms in the context of China [7]. ESG discloses how technology spillovers can be accelerated through digital platforms. For example, ESG-leading firms may seize international technology standards through green patenting, but the existing literature lacks empirical tests of this mechanism.

Third, industry chain resilience studies fail to integrate the comprehensive role of ESG governance. Kano & Oh emphasize that supply chain diversification can enhance OFDI success, but their analysis

is limited to physical layout and fails to integrate ESG governance into the risk resilience framework [8]. For example, environmental risk management reduces host-country environmental policy shocks, and social responsibility fulfillment mitigates operational risks caused by cultural conflicts [9], but existing studies have not quantified the contribution of such ESG practices to industry chain resilience. In addition, Chinese state-owned enterprises (SOEs) tend to have stronger ESG resource integration capabilities due to policy support [10], whereas private firms are constrained by narrow financing channels [11], a heterogeneity that has rarely been addressed in existing theories.

Finally, the research on the link between ESG and OFDI is still in its infancy, and there are contextual and methodological limitations. International literature is mostly based on mature markets, and its conclusions are not directly applicable to Chinese firms due to institutional differences. Friede argues that ESG enhances corporate value [12], but Di points out that initial investment in ESG may inhibit short-term performance, a divergence that may be even more pronounced in the Chinese market, where policy-driven ESG practices predominate [13]. Although domestic scholars have tried to explore the localization of ESG, they have mostly used a single intermediary variable, and have not tested the synergistic mechanism of financing constraints-industrial upgrading-resilience enhancement, nor have they introduced the emerging moderating variables, such as digital trade. There is also no introduction of new moderating variables such as digital trade to explain the boundary conditions of the ESG effect.

This paper aims to fill the above gaps by systematically revealing the multi-dimensional mechanism by which ESG affects OFDI scale through alleviating financing constraints, driving industrial upgrading and enhancing industry chain resilience, and introducing the moderating effect of digital trade to analyze how ESG practices and digital synergies can amplify the kinetic energy of OFDI. The study provides theoretical support and practical insights for Chinese enterprises to optimize ESG governance and cope with the challenges of globalization.

## 2. Mechanism analysis and hypothesis development

Under the background that ESG rating system is gradually accepted by the international capital market, Chinese enterprises with higher ESG scores have relatively greater advantages when going abroad and making outward direct investments. Firstly, higher ESG scores can help to reduce the information asymmetry between Chinese enterprises and the investors, reduce the relevant debt costs, ease the relevant financing constraints, and then obtain more financing opportunities and investment opportunities, thus promoting the expansion of OFDI. Secondly, ESG concepts promote industrial upgrading by reshaping corporate strategic objectives and resource allocation, which in turn promotes the expansion of OFDI. Thirdly, ESG significantly improves the risk-resistant ability and adaptability of enterprises through environmental risk management, social responsibility fulfillment, and optimization of the governance structure, which in turn promotes the OFDI of enterprises. Based on this, this paper presents:

Hypothesis 1: ESG has a significant positive impact on OFDI

Hypothesis 1a: ESG promotes OFDI by influencing financing constraints

Hypothesis 2a: ESG promotes OFDI by facilitating industrial upgrading

Hypothesis 3a: ESG promotes OFDI by increasing industrial resilience

Goldfarb et al. find that digital platforms accelerate ESG disclosure and enhance investor recognition of ESG-driven projects, which in turn improves capital allocation efficiency. Meanwhile, UNCTAD suggests that the cross-border attributes of digital trade may prompt firms to meet multilateral market standards through ESG practices, thus making it easier to obtain international green financing support. Based on this, this paper proposes:

Hypothesis 2: Digital trade significantly contributes to the impact of ESG on OFDI

### 3. Empirical design

This paper will establish a regression model based on the theoretical mechanism of the impact of ESG disclosure of investor companies on the return of OFDI of Chinese enterprises proposed above. In this paper, the outward investment return rate of Chinese enterprises is taken as the explanatory variable, the ESG score of investor enterprises is taken as the independent variable, and introduces investor enterprises' own size, investor enterprises' own gearing ratio, investor enterprises' life span, and investor enterprises' capital turnover rate as the control variables to construct the research model:

$$OFDI_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_n \sum controls_{i,t} + \lambda_t + \varepsilon_{i,t} \quad (1)$$

Where t denotes the year, OFDI<sub>i,t</sub> is an explanatory variable representing the return on outward investment of Chinese firms at point t, the core explanatory variable is ESG<sub>i,t</sub> representing the ESG performance of firms at point t, and the set of control variables is controls<sub>i,t</sub>.

### 4. Empirical results

#### 4.1. Descriptive statistics

The data related to the explanatory variable OFDI can be seen in the table 1. The mean investment amount is 2.7445. the standard deviation is 0.3088 which indicates that the volatility of the investment amount is relatively low. The median is 2.8067, which is slightly higher than the mean, possibly implying that the data distribution is skewed towards normality. In contrast, the explanatory variable ESG rating has a minimum value of 1 and a maximum value of 7.75. The mean ESG rating is 4.1881. with a standard deviation of 0.9432, which indicates greater volatility in ratings.

**Table 1.** Descriptive statistics

VarName	Obs	Summary Mean	Statistics SD	Median	Min	Max.
OFDI	3360	2.7445	0.3088	2.8067	-1.0154	3.0488
ESG	3360	4.1881	0.9432	4.0000	1.0000	7.7500
size	3360	22.3621	1.3373	22.1144	19.4149	26.4297
ATO	3360	0.7010	0.4831	0.6023	0.0546	2.9066
Cashflow	3360	0.0429	0.0717	0.0410	-0.2244	0.2825
INV	3360	0.1617	0.1431	0.1249	0.0000	0.7778
FIXED	3360	0.1868	0.1462	0.1541	0.0016	0.7648
SOE	3360	0.3435	0.4749	0.0000	0.0000	1.0000

#### 4.2. Analysis of regression results

As can be seen from the table 2, the effect of ESG on OFDI is significant under different model settings, but the coefficients and significance levels vary. The first column (without control variables): the ESG coefficient is 0.029, which is significant at the 1% level, indicating that ESG has a significant positive effect on OFDI, but there may be omitted variable bias. The second column (adding control variables): ESG coefficient decreases to 0.0138, significant at the 10% level, indicating that control variables partially explain the effect of ESG, and the positive effect of firm size (size) on OFDI is particularly significant. The third column (adding time-fixed effects): the ESG coefficient is further trimmed to 0.0148, which is still significant at the 10% level, indicating that the time fixed effects control the unobservable in the time dimension and enhance the robustness of the model.

**Table 2.** Analysis of regression results

	OFDI	OFDI	OFDI
ESG	.029***	0.0138*	0.0148*
	(.005)	(2.3791)	(2.5312)
size		0.0480***	0.0443***
		(11.3938)	(10.2002)
ATO		-0.0231*	-0.0175
		(-2.1350)	(-1.5982)
Cashflow		0.2047 **	0.1763 *
		(2.7076)	(2.2909)
INV		-0.0373	-0.0077
		(-0.9724)	(-0.1971)
FIXED		-0.0146	0.0008
		(-0.3881)	(0.0202)
SOE		-0.0429 ***	-0.0364*
		(-3.7558)	(-3.1431)
cons	2.62***	1.6433**	1.7323**
N	3555	3360	3360
YEAR	NO	NO	YES
R-squared	.008	0.0498	0.0565

*t* statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

## 5. Robustness tests:

We conduct robustness tests in table 3. In order to further test the reliability of the empirical results, and at the same time to avoid the impact of different ESG rating methods on the empirical results. The core explanatory variable is replaced from CSI ESG rating to Bloomberg ESG rating for testing, and the regression results show that the coefficient of ESG rating is 0.005, and the t-value is 5.83, which is significant at the level of 0.1%, which further verifies that the enterprises with higher ESG ratings are more likely to enhance the scale of OFDI. In order to further test the empirical results and avoid the influence of possible omitted variables on the empirical results, the relevant control variables are further increased, and ESG ratings are all significant at the 5% level of significance, which further verifies that the higher the ESG ratings obtained, the more likely the enterprises are to enhance the scale of OFDI.

**Table 3. Robustness test**

	OFDI	OFDI	OFDI	OFDI
ESG	0.0148**	0.0143**		0.0148**
	(2.53)	(2.43)		(2.22)
ESG1			0.0060***	
			(5.52)	
size	0.0443***	0.0367***	0.0320***	0.0443***
	(10.20)	(7.64)	(5.04)	(11.91)
ATO	-0.0175	-0.0254**	-0.0298**	-0.0175
	(-1.60)	(-2.27)	(-2.12)	(-1.25)
Cashflow	0.1763**	0.1681**	0.1932*	0.1763**
	(2.29)	(2.04)	(1.71)	(2.31)
INV	-0.0077	-0.0376	-0.0376	-0.0077
	(-0.20)	(-0.94)	(-0.72)	(-0.18)
FIXED	0.0008	-0.0107	-0.0144	0.0008
	(0.02)	(-0.28)	(-0.26)	(0.02)
SOE	-0.0364***	-0.0465***	-0.0314**	-0.0364***
	(-3.14)	(-3.97)	(-1.97)	(-3.05)
ROA		0.2383**		
		(2.27)		
LEV		0.1544***		
		(4.66)		
Growth		-0.0448***		
		(-2.99)		
cons	1.7323***	1.8403***	2.0132***	1.7323***
	(18.39)	(18.62)	(7.99)	(22.16)
N	3360	3347	1467	3360
YEAR	YES	YES	YES	YES
adj. R <sup>2</sup>	0.051	0.058	0.066	0.051

*t* statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

## 6. Heterogeneity analysis

The impact of ESG ratings of enterprises of different sizes on OFDI is examined in table 4. The results are shown in the figure below, for large enterprises, the ESG rating coefficient is 0.0224, which is significant at the 1% significance level, indicating that among large enterprises, the higher the ESG score obtained, the more likely it is that the enterprise will increase the size of OFDI. For SMEs, the ESG coefficient is 0.0021, which is not significant. This implies that among small and medium-sized firms, ESG ratings do not have a significant effect on OFDI size. The coefficient of the interaction term, 0.0071 ( $t=1.83$ ), is significantly positive at the 10% level, indicating that: the marginal effect of ESG ratings on OFDI (logarithm of capital investment) increases by 0.0071 when the size of the firm (size) increases by 1 unit.

We examine the impact of ESG ratings of state-owned enterprises and non-state-owned enterprises on OFDI in table 4. Based on the regression results, it is found that in the regression based on state-owned enterprises, the coefficient of ESG rating is 0.0381, which is significant at a 1% significance level. In the regression based on non-state-owned enterprises, the ESG coefficient is -0.0006, insignificant. This means that ESG ratings have no significant effect on OFDI in non-state-owned enterprises. At the same, the regression results show that the coefficient of the interaction term between ESG ratings and SOE (ESG\_SOE) is 0.0458 ( $t=3.9418$ ), which is significantly positive at the 1% level, indicating that SOE (state-owned enterprise) status significantly enhances the contribution of ESG performance to capital investment. Specifically, for SOEs, for every 1-unit

increase in ESG ratings, the level of capital investment increases by an additional 0.0458 units, and after superimposing the ESG main effect (coefficient 0.0186), the total effect reaches 0.0644, which is significantly higher than that of the ESG main effect for non-SOEs (0.0186).

**Table 4.** Heterogeneity analysis

	OFDI	OFDI	OFDI	OFDI
ESG	0.0224 ***	0.0021	0.0381 ***	-0.0006
	(3.02)	(0.22)	(3.50)	(-0.09)
size	0.0441 ***	0.0200	0.0439 ***	0.0463 ***
	(6.95)	(1.20)	(5.59)	(8.78)
ATO	-0.0241 *	0.0064	-0.0239	-0.0150
	(-1.84)	(0.30)	(-1.24)	(-1.14)
Cashflow	0.2378 **	0.0593	0.3311 **	0.1146
	(2.28)	(0.53)	(2.33)	(1.25)
INV	-0.0051	-0.0843	-0.0979	0.0442
	(-0.11)	(-1.00)	(-1.57)	(0.87)
FIXED	-0.0229	0.0683	-0.1842 ***	0.1252 ***
	(-0.46)	(1.13)	(-2.66)	(2.73)
SOE	-0.0625 ***	0.0303		
	(-4.42)	(1.45)		
cons	1.7269 ***	2.2532 ***	1.6595 ***	1.7088 ***
	(11.76)	(6.47)	(9.90)	(14.59)
YEAR	YES	YES	YES	YES
<i>N</i>	2089	1273	1154	2206
adj. <i>R</i> <sup>2</sup>	0.047	0.012	0.064	0.052

*t* statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

## 7. Mechanism testing

### 7.1. Mediated effects test

Based on the regression results in Table 5, the coefficient of ESG rating on Fz index is -0.5087 ( $t=-43.9371$ ), which is significant at the 1% level, indicating that ESG performance enhancement significantly reduces the Fz index of the firms. The Fz index usually reflects the degree of corporate financing constraints (the higher the value, the stronger the constraints), and, specifically, for every 1-unit enhancement in ESG ratings, the Fz index decreases by about 0.51 units. This result suggests that Chinese enterprises can further improve their financing conditions by improving the ESG and thus enhancing corporate transparency and social trust, reducing external financing risks, and further improving financing conditions. The coefficient of ESG rating on Industrial Structure Upgrading Index is 0.0218 ( $p<0.01$ ), which is significantly positive at the 1% level, indicating that the improvement of ESG performance significantly promotes industrial structure upgrading at the regional or enterprise level. Specifically, for every 1-unit increase in ESG rating, the Industrial Structure Upgrading Index rises by 0.0218 units on average. This result supports the core logic that ESG promotes the transformation of industries to high value-added and low-carbonization by driving technological innovation. The coefficient of ESG rating on industrial chain resilience is 0.0060 ( $p<0.01$ ), which is significantly positive at the 1% level, indicating that the improvement of ESG performance can enhance industrial chain resilience. Specifically, for every 1-unit increase in ESG rating, the industrial chain resilience index rises by 0.0060 units. It further suggests that ESG may enhance industry chain resilience by optimizing supply chain risk management.

The mechanism of influence from mediating variables to OFDI has been described in the previous literature review section.

**Table 5.** Mediated effects test

	Fz	Industrial Structure Upgrading Index	Industrial Chain Resilience
ESG	-0.5087***	0.0218***	0.0060***
	(-43.9371)	(0.01)	(0.00)
controls	YES	YES	YES
cons	-4.0929***	-1.6185***	-1.6185***
	(-21.0398)	(0.13)	(0.13)
Year	YES	YES	YES
N	29769	21524	21524
adj. R <sup>2</sup>	0.454	0.037	0.037

t statistics in parentheses

\* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001

## 7.2. Moderating effects test

The regression results in table 6 show that the coefficient of the interaction term (ESG\*E-commerce Turnover) between ESG and digital trade (E-commerce Turnover) is 3.32 (t=5.58), which is significantly positive at the 1% level, suggesting that digital trade significantly strengthens the role of ESG performance in promoting capital investment. Although neither the ESG main effect (0.0083) nor the digital trade main effect (-0.0041) is significant, the high coefficient of the interaction term highlights the existence of a deep synergy between the two: for every one unit increase in ESG, the increase in capital investment can be as much as 0.0332 units in the context of a higher level of digital trade. This result reveals that digital trade may amplify the "signaling value" of ESG through information integration and resource reallocation.

**Table 6.** Moderating effects test

	OFDI	OFDI
ESG	0.0130*	0.0083
	(1.94)	(1.24)
Ecommerce Turnover	0.0035	-0.0041
	(0.44)	(-0.51)
ESG Ecommerce turnover		0.0332***
		(5.58)
controls	YES	YES
cons	1.6555***	1.6519***
	(14.42)	(14.47)
YEAR	YES	YES
N	2577	2577
adj. R <sup>2</sup>	0.046	0.057

t statistics in parentheses

\* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001

## 8. Conclusion

With the deepening of globalization and the widespread dissemination of the concept of sustainable development, ESG (Environmental Protection, Social Responsibility, and Corporate Governance) is gradually recognized and accepted by the world, and further affects the investment of enterprises. In this paper, we use the OLS regression model to study the relevant impact of enterprises' ESG ratings on the scale of OFDI. The results of the study show that: firstly, enterprises with higher ESG ratings are more likely to enhance corporate transparency and social trust, reduce external financing risks, and thus alleviate financing constraints and promote the expansion of the scale of OFDI. Secondly, ESG promotes the transformation of industries to high value-added and low-carbonization by driving technological innovations, which promotes the shift of OFDI from resource-seeking to technology-seeking, and increases its scale. Thirdly, ESG may enhance the resilience of

the industrial chain by optimizing supply chain risk management. In turn, it mitigates the impact of host country policy uncertainty through diversified supply chain layout and rapid risk response capability and enhances the scale of OFDI. At the level of moderating effect, digital trade further amplifies the signal value of ESG through information integration and resource reallocation, thus expanding the role of ESG in promoting the increase of OFDI scale. Future studies could analyze ESG's heterogeneous effects on OFDI across industries and regions, focusing on emerging markets. Dynamic models or machine learning may improve causal robustness. Qualitative case studies could further explore how ESG strategies adapt to host-country institutional contexts.

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