

The Impact of Voluntary Environmental Regulation on Firm ESG Performance: the Moderating Role of Competitive Strategy

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Abstract. China has achieved historic strides in both its social and economic development. Nevertheless, in the process of economic expansion, numerous issues with governance and environmental harm have arisen, such as excessive emissions from manufacturing companies, regular safety incidents and disarray in internal management. The environmental, social, and governance (ESG) performance of businesses is now a crucial indicator of sustainable and green development. Green transformation is also inseparable from government support, which guiding enterprises to take the initiative to assume the social responsibility of environmental protection. As an innovative policy, voluntary environmental regulation has attracted more and more attention. At the same time, different types of competitive strategies play an important guiding role in environmental regulation and ESG performance. This paper takes A-share listed manufacturing enterprises from 2012 to 2021 as the research object. Through multiple regression analysis and robustness test, the results show that voluntary environmental regulation can promote the ESG performance of manufacturing enterprises. and the adjustment mechanism test shows that different competitive strategies will affect the relationship between voluntary environmental regulation and ESG performance.

Keywords: voluntary environmental regulation, ESG performance, competitive strategy.

1 Introduction

At present, China's manufacturing enterprises still have too much dependence on too much material resources, relying on extensive expansion, high energy consumption and high emissions of the industrial development model. Therefore, it is urgent for the government to guide enterprises to assume the social responsibility of environmental protection. By strengthening the standard certification system for green and low-carbon products and services, voluntary environmental regulations force companies to actively research more sustainable green technologies, and encourages enterprises to spontaneously provide environmentally sustainable products. More and more people are concerned about voluntary environmental regulation, it has gradually become a new direction of environmental regulation research. By integrating environmental, social and governance factors into the system, ESG highlights the incremental contribution of companies to the environment, consumers and society. ESG performance improves company reputation by reducing information uncertainty and forms a lasting competitive advantage. ESG performance largely depends on the efficiency of relevant

policy formulation and implementation. As a new tool, Can voluntary environmental regulation affect corporate ESG performance?

Many scholars have studied the impact of voluntary environmental regulation on various aspects of enterprises. Renning (2006) noted that Investors who were concerned about the sustainable development of enterprises increased their investment in enterprises, so enterprises with ISO14001 certification could have more funds to invest in green innovation activities^[1]. Treacy noted that ISO14001 certification had the function of pollution prevention, so that the tangible assets of the enterprise were effectively used, thereby improving the overall organizational efficiency^[2]. Graafland (2018) believed that previous studies had ignored the mediating variables of ISO14001's positive effect on ecology. Through empirical analysis, they concluded that ISO14001 certification stimulated the participation of external environmental networks, and this environmental network had a favorable impact on participants' ecological performance^[3]. Yang Mian et al. (2022) believed that ISO14001 certification could lead to innovation effects by reducing compliance costs, mitigating regulatory risks and improving social reputation^[4]. The existing literature mainly explored the impact mechanism of voluntary environmental regulation from the aspects of environmental performance, firm performance and firm innovation, etc., and rarely analyzed the impact mechanism of environmental regulation flexibility on firm ESG performance from the micro level. According to the existing research, enterprises that adopt voluntary environmental regulation are more likely to pursue sustainable development and pay attention to achieving long-term interests. It can be said that voluntary environmental regulation affects the sustainable development ability of enterprises. Can voluntary environmental regulation improve the ESG performance of enterprises? Based on this, this paper selects A-share manufacturing listed enterprises from 2012 to 2021 as samples. Meanwhile, starting from the adjustment mechanism of competitive strategy, this paper provides new ideas for enterprise strategy, so that enterprises can reasonably choose different competitive strategies. Through main effect analysis, regulatory effect analysis and robustness test, this paper explores the relationship between voluntary environmental regulation and ESG performance.

2 Theoretical analysis and research hypothesis

2.1 Voluntary environmental regulation and ESG performance

In terms of environment, enterprises obtain government recognition through environmental protection certification, avoid government penalties and enjoy government subsidies, so as to alleviate the cost pressure of environmental governance and facilitate enterprises to carry out environmental protection practices^[5]. In terms of social responsibility, enterprises join voluntary environmental regulations not only to avoid the cost of violation, but also to actively demonstrate their legitimacy to the regulatory authorities, and enterprises will be willing to fulfill their social responsibilities^[6]. In the aspect of innovation, under the pressure of ISO14001 environmental certification, companies will voluntarily take risks, Invest more fund in environmental protection projects and research innovative products, and improve enterprise sustainability^[7].

Hypothesis 1: Voluntary environmental regulation can improve the ESG performance of enterprises.

2.2 The moderating effect of competitive strategy

The implementation of low-cost strategies by enterprises may encourage industrial enterprises to use cheap materials and neglect the treatment of environmental pollutants such as waste water and waste gas^[8]. If the cost of green product production and environmental protection process is too high, The effect of voluntary environmental regulation is not significant because of its weak constraint effect. Enterprises implementing differentiation strategy should increase R&D investment in order to create their own competitive advantages^[9]. Because of voluntary environmental regulations, enterprises producing green differentiated products can take the initiative to improve the quality of life for consumers and create more social value^[10]. Figure 1 is the research hypothesis model.

Hypothesis 2a: The low-cost strategy negatively moderates the effect of voluntary environmental regulation on ESG performance.

Hypothesis 2b: Differentiation strategy positively moderates the effect of voluntary environmental regulation on ESG performance.

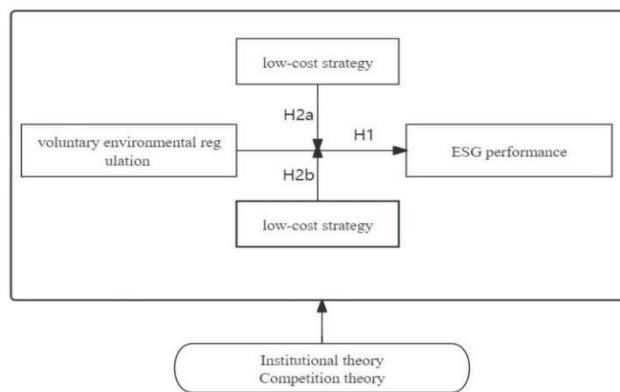


Fig. 1. Architecture of a typical wireless sensor node.

3 Empirical analysis

3.1 Sample selection

This paper takes A-share manufacturing listed enterprises from 2012 to 2021 as the research object, and excludes ST, *ST enterprises and samples with abnormal data loss. The original data come from Wind and CSMAR databases. Considering that extreme values may lead to bias in results, all variables in this paper are processed by 1% and 99% indentation, and 14,566 observed values are obtained.

3.2 Variable definition

The explained variable is ESG performance (ESG). ESG score of China Securities ESG rating system is adopted. The higher the total score, the better the ESG performance.

The explanatory variable is voluntary environmental regulation (VER). The implementation of the ISO14001 environmental management system standard is used as a measure of voluntary environmental regulation. If an enterprise passes the ISO14001 environmental certification, VER is 1; otherwise, VER is 0.

The regulatory variable is competitive strategy, which is divided into low cost strategy (LS) and differentiation strategy (DS). Using operating costs as a percentage of revenue to measure low cost strategies; The ratio of the sum of selling and administrative expenses to revenue is used to measure the differentiation strategy^[8].

From the perspective of corporate governance, company Size (Size), operating cash flow (Cf), asset-liability ratio (Lev), company value (TobinQ), listing Age (Age), number of shares held by the first shareholder (Top1), and proportion of independent directors (Indep) are selected as control variables.

3.3 Model setting

In order to verify the hypothesis, this paper adopts multiple linear regression method, and builds an OLS model to analyze the multivariate variables. The fixed effects of year and industry are added to the model. Equation (1) was the main effect model, and Equation (2) and (3) were the adjustment effect models with interaction terms VER*LS and VER*DS. The model design is as follows:

$$ESG_{i,t} = \beta_0 + \beta_1 VER_{i,t} + \beta \sum Control_{i,t} + YEAR + IND + \varepsilon_{i,t} \quad (1)$$

$$ESG_{i,t} = \beta_0 + \beta_1 VER_{i,t} + \beta_2 VER_{i,t} * LS_{i,t} + \beta_3 LS_{i,t} + \beta \sum Control_{i,t} + YEAR + IND + \varepsilon_{i,t} \quad (2)$$

$$ESG_{i,t} = \beta_0 + \beta_1 VER_{i,t} + \beta_2 VER_{i,t} * DS_{i,t} + \beta_3 DS_{i,t} + \beta \sum Control_{i,t} + YEAR + IND + \varepsilon_{i,t} \quad (3)$$

4 Empirical results and analysis

4.1 Descriptive statistics

A total of 14,566 sample individuals from 2,457 A-share listed enterprises are selected for descriptive statistics in this paper, as shown in Table 1.

Table 1. Summary Statistics

Var	Obs	Mean	SD	Min	Median	Max
ESG	14566	73.1307	5.270	57.50	73.45	84.18
VER	14566	0.3176	0.466	0.00	0.00	1.00
LS	14566	0.7036	0.169	0.16	0.74	0.98
DS	14566	0.1664	0.123	0.02	0.13	0.63
Size	14566	22.0579	1.130	20.11	21.90	25.67
Cf	14566	0.0534	0.063	-0.12	0.05	0.24
Lev	14566	0.3805	0.182	0.06	0.37	0.82
TobinQ	14566	2.1699	1.319	0.89	1.74	8.43
Age	14566	2.8932	0.307	1.95	2.94	3.50
Top1	14566	0.3317	0.139	0.09	0.31	0.70
Indep	14566	0.3770	0.054	0.33	0.36	0.57

As can be seen from the table, the maximum and minimum values of ESG performance (ESG) are 84.18 and 57.5, indicating that ESG performance of different companies is significantly different. The mean value of voluntary environmental regulation (VER) is 0.3176, indicating that the level of ISO14001 environmental management system in China's manufacturing industry needs to be improved.

4.2 Mechanism test

Table 2 of column (1) examines the impact of voluntary environmental regulations on ESG performance of manufacturing enterprises using the OLS model. The regression coefficient of VER is 2.076, with a significant positive correlation at the 1% level. The results show that voluntary environmental regulation can strengthen the ESG performance of enterprises. The means to further achieve the double carbon target under voluntary environmental regulation can actively guide the improvement of enterprises' sustainable development performance. Hypothesis 1 is verified. Column (2) is the test result of the moderating effect of the low-cost strategy. The coefficient of VER*LS is -2.9149, which is significant at the 1% level, indicating that the low-cost strategy negatively moderates the enhancement effect of voluntary environmental regulations on ESG performance and exerts a "substitution effect". Hypothesis2a is verified. Column (3) is the test result of the moderating effect of differentiation strategy. The coefficient of VER*DS is 3.6836, which is significant at the 1% level, indicating that differentiation strategy positively moderates the enhancement effect of voluntary environmental regulation on ESG performance and exerts a "complementary effect". Hypothesis2b is verified.

Table 2. Mechanism test

	(1)	(2)	(3)
	ESG	ESG	ESG
VER	2.0726*** (23.5287)	4.1780*** (10.2595)	1.4854*** (9.9201)
VER*LS		-2.9149*** (-5.2434)	
VER*DS			3.6836*** (4.6512)
LS		-1.8460*** (-4.8391)	
DS			-3.1771*** (-6.6950)
Size	1.3913*** (30.8226)	1.3685*** (30.3492)	1.3581*** (29.8914)
Cf	5.6208*** (8.1132)	4.5554*** (6.4599)	5.3209*** (7.6692)
Lev	-6.3843*** (-23.6832)	-5.6937*** (-19.9931)	-6.5532*** (-24.1907)

TobinQ	0.0067 (0.1875)	-0.0468 (-1.2913)	0.0176 (0.4944)
Age	-0.5345*** (-3.5877)	-0.4308*** (-2.8872)	-0.5402*** (-3.6319)
Top1	1.9786*** (6.5682)	2.0546*** (6.8359)	1.9245*** (6.3935)
Indep	6.9298*** (9.1242)	6.7653*** (8.9239)	7.1003*** (9.3568)
Year	Yes	Yes	Yes
Ind	Yes	Yes	Yes
<i>N</i>	14566	14566	14566
adj. <i>R</i> ²	0.154	0.159	0.157

4.3 Robustness test

Considering that there may be reverse causality between voluntary environmental regulation and ESG performance, this paper further adopts the ESG of phase t+1 as the explained variable for regression analysis. The regression results are shown in column (1) of Table 3. The coefficient of VER is 2.2325, which is significant at 1% level, indicating that voluntary environmental regulation can still improve ESG performance.

In order to test the sensitivity of the explained variable, this paper replaced the measurement method of ESG performance (ESG) and adopted the grade assignment of ESG score as the explained variable for further test. As shown in column (2) of Table 3, the coefficient of VER is 0.4006, which is significant at 1% level, indicating that the above conclusion is still robust.

Table 3. Robustness test

	(1) F.ESG	(2) ESG1
VER	2.2325*** (22.3296)	0.4006*** (21.8790)
Size	1.5149*** (29.3382)	0.2754*** (29.3547)
Cf	9.0604*** (11.5643)	1.0936*** (7.5943)
Lev	-6.3933*** (-20.8336)	-1.2904*** (-23.0304)
TobinQ	0.1176*** (2.7438)	-0.0013 (-0.1801)
Age	-0.2013 (-1.2068)	-0.1018*** (-3.2865)
Top1	1.3416*** (3.9709)	0.3897*** (6.2242)
Indep	6.1721*** (7.1916)	1.3307*** (8.4294)
Year	Yes	Yes
Ind	Yes	Yes
<i>N</i>	11806	14566
adj. <i>R</i> ²	0.166	0.141

5 Conclusions and recommendations

The empirical results of this paper show that: (1) Voluntary environmental regulation can improve the ESG performance of enterprises. (2) The low-cost competition strategy negatively moderates the promotion effect of voluntary environmental regulations on the ESG performance of enterprises, and exerts a substitution effect. (3) The differentiated competition strategy positively moderates the promoting effect of voluntary environmental regulation on the ESG performance of enterprises and plays a complementary effect.

Based on the above conclusions, the following suggestions are put forward: First, the government should encourage enterprises to exert their subjective initiative and actively implement voluntary participatory environmental regulation. Second, enterprises should implement differentiation strategy and take the initiative to implement voluntary participatory environmental regulation. The R & D department actively promotes green innovation, applies green innovation to various processes of production, and ultimately improves the sustainable development ability of enterprises.

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