



# ESG Responsibility Fulfillment, Executive Compensation Incentives and New Quality Productive Forces

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**Abstract.** Actively practicing ESG concept can promote new quality productive forces to achieve high-quality economic development. The article takes the financial data of A-share listed companies in China from 2013 to 2023 as the research sample to examine the impact and adjustment mechanism of ESG responsibility fulfillment on corporate new quality productive forces. Research has found that fulfilling ESG responsibilities significantly promotes new quality productive forces. Research on moderating effect shows that executive compensation incentives strengthen the promotion effect of ESG responsibility fulfillment on the new quality productive forces of enterprises. Heterogeneity analysis shows that compared to non-state-owned enterprises and large enterprises, the ESG responsibility fulfillment of state-owned enterprises and small and medium-sized enterprises have a more significant promoting effect on new quality productive forces of enterprises. The article enriches the research on the deep interaction between ESG responsibility fulfillment and new quality productive forces of enterprises, which has enlightening significance for promoting high-quality development of enterprises.

**Keywords:** ESG responsibility fulfillment, New quality productive forces, Executive compensation incentives

## 1 Introduction

New quality productive forces are an inevitable product of China's high-quality economic and social development in the new era, characterized by high technology, high efficiency, and high quality. The development concept of ESG (environment, society, and governance) is compatible with new quality productive forces in multiple aspects. The current research on fulfilling ESG responsibilities mainly focuses on two thematic areas: micro and macro. At the micro level, research has found that fulfilling ESG responsibilities has a significant impact on corporate value, risk, innovation, and operational difficulties. Specifically, the fulfillment of ESG responsibilities can significantly enhance corporate value and achieve this effect by promoting green innovation (Wu et al., 2024)<sup>1</sup>. In addition, there is a significant U-shaped relationship between fulfilling

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ESG responsibilities and corporate risks. Moderate ESG responsibility fulfillment can help reduce corporate risks, but excessive fulfillment may lead to negative effects (Chen et al., 2024)<sup>2</sup>. ESG responsibility fulfillment has also been proven to promote corporate innovation, with financial flexibility playing an intermediary role in this process, and executive risk preference significantly enhancing the promotion of ESG responsibility fulfillment on corporate innovation (Wang et al., 2024)<sup>3</sup>. At the macro level, research focuses on the impact of fulfilling ESG responsibilities on the broader socio-economic environment and long-term sustainable development of enterprises, involving aspects such as total factor productivity, core competitiveness, and financial performance. The fulfillment of ESG responsibilities can improve the total factor productivity of enterprises, and under low environmental uncertainty conditions, the positive moderating effect of institutional investors' shareholding levels is more significant (Yu et al., 2023)<sup>4</sup>. In addition, the fulfillment of ESG responsibilities can promote the improvement of a company's core competitiveness, mainly by alleviating financing constraints, enhancing research and development investment, and improving human capital. At the same time, it also helps to enhance the company's green core competitiveness (Liu et al., 2024)<sup>5</sup>. The impact of ESG responsibility fulfillment on financial performance of industrial enterprises exhibits a U-shaped nonlinear characteristic, while competitive strategy strengthens the U-shaped relationship between the two. Compared with low-cost strategies, differentiation strategies have a stronger U-shaped regulatory effect on CFP-ESG (Wang et al., 2022)<sup>6</sup>. These research directions not only demonstrate the positive role of ESG responsibility fulfillment in different fields, but also reveal the differences in the effectiveness of ESG responsibility fulfillment under different ownership, industry, and regional backgrounds. These differences provide important theoretical and empirical basis for a deeper understanding of the complexity and multidimensionality of fulfilling ESG responsibilities.

Another theme related to this article is new quality productive forces. At present, there is relatively little research on new quality productive forces. Digital transformation has a significant positive impact on the development of new quality productive forces in enterprises, and the technological and management innovations brought about by digital transformation meet the conditions for the emergence of new quality productive forces (Zhang et al., 2024)<sup>7</sup>. The development of ESG can improve the relationship between enterprises and stakeholders, reduce the level of intermediate product costs and debt financing costs, increase the proportion of institutional shareholding, and thus promote the improvement of the level of new quality productive forces of enterprises (Song et al., 2024)<sup>8</sup>.

Compared to previous research, we make several marginal contributions. Firstly, from the perspective of fulfilling ESG responsibilities, I have revealed its important role in new quality productive forces of enterprises, filling the gap in the current literature on the deep interaction between ESG responsibility fulfillment and new quality productive forces of enterprises, and becoming an important supplement to the literature on new quality productive forces of enterprises. Secondly, as the driving force for enterprise development, new quality productivity is influenced by many factors. Currently, most of the research is based on qualitative aspects. This article uses empirical methods to examine the impact and moderating effect of ESG responsibility fulfillment

on new quality productive forces of Chinese A-share listed companies from 2013 to 2023 as the research sample. Thirdly, it reveals the impact of executive compensation incentives on the relationship between ESG responsibility fulfillment and new quality productive forces of enterprises. And it analyzes the differences between ESG responsibility fulfillment and new quality productive forces of different enterprises based on property heterogeneity and enterprise size, providing empirical evidence and inspiration for ESG to promote the development of new quality productive forces of enterprises.

## **2 Theoretical Analysis and Research Hypotheses**

### **2.1 ESG Responsibility Fulfillment and New Quality Productive Forces of Enterprises**

New quality productive forces play a leading role in innovation. They have the characteristics of high technology, high efficiency, and high quality, and are marked by a significant increase in total factor productivity. Fulfilling of ESG responsibilities can help companies accumulate unique resources and capabilities, thereby improving their new quality productive forces. On the one hand, according to the Resource-Based Theory, the different tangible and intangible resources possessed by enterprises can be transformed into unique capabilities. These unique resources and capabilities are the source of sustained competitive advantage for enterprises, which can help reduce resource waste, improve resource utilization efficiency, thereby reducing costs and increasing production efficiency. And fulfilling ESG responsibilities encourages companies to adopt new technologies and innovative methods to address environmental and social issues, helping them develop innovative products and services, and enhancing their innovation capabilities. On the other hand, according to the Signaling Theory, by actively fulfilling ESG responsibilities, companies can establish a good social image and enhance trust relationships with various stakeholders. This trust relationship helps companies gain a competitive advantage in the market, such as being more likely to attract investors' attention, improving their financing capabilities, obtaining high-quality raw material supplies, attracting outstanding talents, and gaining the favor of consumers. All of these are more conducive to the high-tech, efficient, and high-quality development of enterprises. Based on the above analysis, this article proposes the following hypotheses:

H1: Fulfilling ESG responsibilities will enhance new quality productive forces of Enterprises

### **2.2 ESG Responsibility Fulfillment, Executive Compensation Incentives and New Quality Productive Forces of Enterprises**

Actively fulfilling ESG responsibilities can directly enhance a company's new quality productivity. Moreover, executive compensation incentives can enhance the effectiveness of this promotion. According to the Principal-agent Theory, the principal pursues greater wealth and focuses on long-term benefits; However, agents who pursue their

own salary, allowance income, luxury consumption, and leisure time maximization are prone to short-sighted behavior, which inevitably leads to conflicts of interest between the two. Incorporating ESG performance into executive compensation incentive mechanisms can ensure that managers' behavior aligns with the company's long-term development goals. This helps managers to pay more attention to the sustainable development of the enterprise, rather than just pursuing short-term financial goals. Secondly, linking ESG goals with executive compensation can stimulate the enthusiasm of management and encourage them to take measures that are conducive to improving the company's ESG performance, thereby indirectly enhancing the company's new quality productive forces. Based on the above analysis, this article proposes the following hypotheses:

H2: Executive compensation incentives will strengthen the promotion effect of ESG responsibility fulfillment on new quality productive forces of enterprises.

### 3 Research Design

#### 3.1 Sample Selection and Data Sources

This article uses the financial statement data of A-share listed companies in CSMAR from 2013 to 2023 and the ESG index data of Huazheng Company, and processes the relevant data as follows: ① Exclude samples of ST and \* ST listed companies with poor management; ② Exclude samples with missing ESG indicators; ③ Exclude samples from the financial and real estate industries; ④ Perform 1% tail reduction processing before and after Winsor2. Finally, 20362 sample data were obtained.

#### 3.2 Variable Definition

1. **Dependent variable.** new quality productive forces of enterprises (Npro) is the dependent variable in this article. Currently, there is relatively little measurement of new quality productive forces of enterprises. This article refers to the The entropy method, based on the two factor theory of productivity, and considers the role and value of labor objects in the production process (Song et al.2024)<sup>8</sup>.
2. **Independent variable.** ESG responsibility fulfillment (ESG) is the independent variable in this article. This article uses the mainstream ESG indicators of Huazheng in China as independent variables for research. The evaluation system is divided into nine levels, with values ranging from 9 to 1 based on the levels of AAA to C (Wu 2024)<sup>1</sup>.
3. **Moderating variable.** Executive compensation incentive (PAY) is the moderating variable in this article. The material compensation for executive compensation incentives mainly includes monetary compensation and equity compensation. At present, the number of companies in China that adopt equity compensation is not ideal, so this article only uses the natural logarithm of the total compensation of the top three executives to measure the degree of executive compensation incentives.

4. **Control variables.** Referring to existing literature, this article selects Age, Size, Level, Roa, Growth, Top1, Indepdir, Dual as control variables, and controls for individual and time effects.

Specific variable definitions are shown in **Table 1**.

**Table 1.** - Specific Variable Description

Variable type	Variable Name	Variable symbol	Variable definition
Dependent Variable	New quality productive forces of enterprises	Npro	new quality productive forces indicators at the enterprise level
Independent variable	ESG responsibility fulfillment	ESG	Assign AAA-C values 9-1 in sequence
Adjusting variable	Executive compensation incentives	Pay	Ln (total compensation of top three executives)
Control variables	Listing age	Age	Year of the year- Year of Listing
	Enterprise scale	Size	Ln (total assets of the enterprise)
	financial leverage	Level	Asset liability ratio
	Profitability	Roa	Net profit margin of total assets
	Growth potential	Growth	Revenue growth rate A
	Concentration of equity	Top1	Shareholding ratio of the largest shareholder
	Proportion of independent directors	Indepdir	Number of independent directors/total number of directors
	Dual employment integration	Dual	If the chairman and general manager are the same person, take 1; otherwise, take 0

### 3.3 Model Settings

To examine the impact of fulfilling ESG responsibilities on new quality productive forces of enterprises, model (1) is constructed:

$$Npro_{it} = \alpha_0 + \alpha_1 ESG_{it} + \alpha_2 Controls_{it} + \sum Year + \sum Firm + \varepsilon_{it} \tag{1}$$

To examine the moderating effect of executive compensation incentives on the relationship between ESG responsibility fulfillment and corporate new quality productive forces, based on model (1), we introduce executive compensation incentives and the interaction term between ESG responsibility fulfillment and executive compensation incentives, and construct model (2) (He et al., 2024)<sup>9</sup>:

$$Npro_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 Pay_{it} + \beta_3 ESG_{it} \times Pay_{it} + \beta_4 Controls_{it} + \sum Year + \sum Firm + \varepsilon_{it} \tag{2}$$

Among them, “i” represents an individual; “t” represents time; “Controls” Representing a series of control variables; “Firm” and “Year” is a fixed effect; “ε” is a random perturbation term. To alleviate potential endogeneity issues, this article uses a two-way fixed effect model that controls for time and individuals for regression.

## 4 Empirical Results and Analysis

### 4.1 Correlation Analysis and Collinearity Diagnosis

**Table 2.** - Statistical table of correlation analysis

	Npro	ESG	Pay	Age	Size	Leve	ROA	Gro	Top1	In-	D
Npr	1										
ES	0.04	1									
Pay	0.19	0.22	1								
Age	0.01	-	0.22	1							
Size	-	0.27	0.47	0.32	1						
Lev	-	-	0.02	0.18	0.23	1					
RO	-	0.07	0.05	-	0.04	-	1				
Gro	-	-	-	-	0.00	0.00	0.00	1			
Top	-	0.09	-	0.04	0.22	0.03	0.03	-	1		
In-	0.03	0.06	-	-	-	-	0.00	0.01	-	1	
Dua	0.06	-	0.02	-	-	-	0.00	-	-	0.11	1

Standard errors in parentheses\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 2** shows the Pearson correlation coefficients for each variable. The coefficient between the independent variable and the dependent variable is significantly positive, which can preliminarily explain H1, that is, fulfilling ESG responsibilities will improve new quality productive forces of enterprises. What's more, the correlation coefficients between the dependent variable, independent variable, and control variable are all less than 0.5, indicating no significant collinearity relationship. Therefore, all variables can be included in the equation to establish a regression for subsequent analysis.

### 4.2 Analysis of Benchmark Regression Results

The benchmark regression used a two-way fixed effects model to test models (1) and (2), controlling for individual and time effects. The regression results are shown in **Table 3**. Columns (1) - (2) analyzed the impact of corporate ESG responsibility fulfillment on new quality productive forces without and with controlled variables. The inspection results show that There is a significant positive correlation between the fulfillment of ESG responsibilities and new quality productive forces of enterprises at the 1% level, indicating that the fulfillment of ESG responsibilities has a significant promoting effect on new quality productive forces of enterprises. H1 is Verified. Further examining the moderating effect of executive compensation incentives on the relationship between the two, it can be seen from the results in column (3) that the regression coefficients of ESG and the interaction term  $ESG \times PAY$  are significantly positive at the 1% level, indicating that executive compensation incentives positively regulate the relationship between ESG responsibility fulfillment and new quality productive forces of enterprises. H2 is Verified.

**Table 3.** - Results of benchmark regression and moderation effect regression

	(1)	(2)	(3)
	Npro	Npro	Npro
ESG	0.043***(0.021)	0.058***(0.022)	0.058***(0.022)
Pay			0.250***(0.045)
ESG×Pay			0.157***(0.026)
Age		-0.468***(0.128)	-0.477***(0.129)
Size		0.189***(0.042)	0.128***(0.043)
Level		-0.483***(0.169)	-0.459***(0.169)
ROA		-5.100***(0.376)	-5.302***(0.379)
Growth		-0.079***(0.025)	-0.074***(0.025)
Top1		-2.783***(0.255)	-2.643***(0.256)
Indepdir		-0.161(0.250)	-0.142(0.250)
Dual		0.017(0.053)	0.003(0.053)
Constant	4.280***(0.086)	7.890***(2.035)	5.657***(2.074)
<i>N</i>	21133	20406	20361
<i>R</i> <sup>2</sup>	0.667	0.681	0.682
Year, ID FE	YES	YES	YES
F	4.156	40.476	36.334

### 4.3 Endogeneity and Robustness Test

**Endogeneity Test.** This article adopts the instrumental variable method to alleviate the endogeneity problem of variables being mutually causal. This article selects the average annual ESG rating of the same industry, as well as the ESG ratings of companies lagging behind by one period and two periods, as instrumental variables(He et al., 2023)<sup>9</sup>. The above three are closely related to the independent variable and therefore meet the requirement of correlation. Meanwhile, the average ESG rating of the same industry will not directly affect the new quality productivity of enterprises. The ESG ratings lagging behind the first and second periods are not related to the current disturbance term in the model due to their "predetermined" characteristics, thus meeting the requirement of exogeneity. **Table 4** shows the regression results of instrumental variables. The weak IV test results show that the Cragg-Donald Wald F-statistics are all greater than the critical value (16.380) of the Stock Logo weak instrumental variable identification F-test at the 10% significance level, indicating that the instrumental variable passed the weak instrumental variable test. In addition, the Anderson canon.corr. LM statistic of the identifiable test rejected the null hypothesis at the 1% significance level, indicating that the instrumental variable satisfies identifiability. The second stage regression results show that the ESG coefficients are significantly positive at the 1% level, indicating that considering endogeneity issues, fulfilling ESG responsibilities will improve new quality productive forces of enterprises. Hypothesis H1 of this study has been validated.

**Table 4.** - Endogeneity test

VARIABLE	Industry aver-		Lag by one period		Lag by two periods	
	first1	second1	first2	second2	first3	second3
	ESG	Npro	ESG	Npro	ESG	Npro
ESG		1.0834** (10.33)		0.1812** (6.42)		0.2278** (5.68)
IV	1.1173** (23.66)		0.7381** (118.19)		0.5198** (62.97)	
Controls	YES	YES	YES	YES	YES	YES
Constant	- (-30.96)	1.4266** (2.47)	- (-11.80)	-1.0128** (-2.47)	- (-15.46)	0.7683* (1.74)
YEAR, ID	YES	YES	YES	YES	YES	YES
Cragg-Don-Anderson	559.592(16.380)		14000(16.380)		3965.230(16.380)	
	535.511(0.000)		6158.427(0.000)		2829.511(0.000)	
N	12,222	12,222	11,007	11,007	9,854	9,854
R-squared	0.070		0.079		0.076	

**Robustness Test.** In this study, the robustness of the empirical results was enhanced by replacing the dependent variable, independent variable and excluding special years. The test results are shown in **Table 5**. This article uses the TFP\_FE and TFP\_OLS forms of total factor productivity to replace Npro in measuring the dependent variable, and uses the annual median of Huazheng ESG score to replace the annual average of Huazheng ESG score in the previous section to measure the independent variable. In the sample period, the COVID-19 after 2020 has a great impact on the development of enterprises. In order to reduce the uncertainty of abnormal years on the research results, the three-year data from 2020 to 2022 will be excluded before regression (Giacomo et al., 2024)<sup>10</sup>. The results show that the fulfillment of ESG responsibilities is still significantly positively correlated with new quality productive forces of enterprises at the 1% level, consistent with the benchmark regression results, indicating the robustness of the previous conclusions.

**Table 5.** - Robustness Test

	Replace the dependent variable		Replace inde-	Exclude abnormal
	TFP_FE	TFP_OLS	Npro	Npro
ESG	0.014***(0.004)	0.013***(0.004)		0.158***(0.020)
ESG_med			0.053***(0.020)	
Controls	YES	YES	YES	YES
Constant	-	-	7.877***(2.035)	4.769***(0.393)
N	20353	20353	20406	14889
R <sup>2</sup>	0.951	0.946	0.681	0.375
Year, ID FE	YES	YES	YES	YES



#### 4.4 Heterogeneity Analysis

**Heterogeneity of Company Property Rights.** As a part of national assets, state-owned enterprises usually bear more social responsibility than non-state-owned enterprises, which encourages them to actively fulfill their ESG responsibilities. Many state-owned enterprises are larger in scale and are more likely to receive support and guidance from government policies, with strong resource allocation capabilities. This means that they can generate greater economies of scale when implementing ESG practices, thereby more efficiently More effectively improve productivity, thereby enhancing new quality productive forces of enterprises. Therefore, state-owned enterprises can more effectively promote the improvement of new quality productive forces in fulfilling their ESG responsibilities.

Based on the above analysis, this article conducts grouped regression analysis on the impact of ESG responsibility fulfillment of state-owned and non-state-owned enterprises on new quality productivity (Javier et al., 2023)<sup>11</sup>. The test results are shown in **Table 6**. Columns (1) and (2) show a significant positive correlation between the fulfillment of ESG responsibilities by state-owned enterprises and their new quality productive forces at the 1% level, while whereas for non-state-owned enterprises, this significant positive correlation is at the 10% level. This indicates that the fulfillment of ESG responsibilities by state-owned enterprises has a more significant promoting effect on their new quality productive forces, which validates the previous analysis.

**Heterogeneity of Enterprise Scale.** Small and medium-sized enterprises pay more attention to the effective use of resources, including human capital and social capital, which helps them improve efficiency and innovation capabilities through ESG practices. Although large enterprises have abundant resources, there is greater internal competition in resource allocation, which makes it difficult for certain ESG initiatives to receive sufficient support. Secondly, small and medium-sized enterprises often need to seek new growth points to maintain competitiveness. And ESG practice can serve as an innovative path to help them develop new products and services. Large enterprises may have established mature business models, and their sense of urgency for change is not as strong as that of small and medium-sized enterprises. Therefore, small and medium-sized enterprises can more effectively promote the improvement of new quality productive forces in fulfilling their ESG responsibilities.

Based on the above analysis, this article conducts grouped regression on the impact of ESG responsibility fulfillment on new quality productive forces of large and small and medium-sized enterprises. The test results are shown in **Table 6**. Columns (3) and (4) show that the ESG responsibility fulfillment of both large and small and medium-sized enterprise groups is significantly positively correlated with new quality productive forces of enterprises at the 5% level. However, the promotion in the small and medium-sized enterprise group is more significant, which confirms the previous analysis.

**Table 6.** - Heterogeneity test

	(1)	(2)	(3)	(4)
	state-owned	Non-state-owned	Large enter-	Small and
	Npro	Npro	Npro	Npro
ESG	0.116*** (0.030)	0.048* (0.029)	0.052** (0.026)	0.071** (0.036)
Constant	12.147*** (2.986)	2.946 (2.657)	4.092* (2.378)	6.488* (3.546)
<i>N</i>	11759	8422	10120	10150
<i>R</i> <sup>2</sup>	0.706	0.696	0.784	0.701
Year, ID FE	YES	YES	YES	YES

## 5 Research Conclusion and Implications

Actively practicing ESG concept can promote new quality productive forces to achieve high-quality economic development. This article empirically studies the impact and moderating effect of ESG responsibility fulfillment on the new quality productive forces of A-share non-financial listed companies from 2013 to 2023. The conclusion is as follows: (1) Fulfilling ESG responsibilities will improve new quality productive forces of enterprises. (2) Executive compensation incentives will strengthen the promotion effect of fulfilling ESG responsibilities on new quality productive forces of enterprises. (3) Heterogeneity analysis shows that compared to non-state-owned enterprises and large enterprises, the ESG responsibility fulfillment of state-owned enterprises and small and medium-sized enterprises has a more significant promoting effect on new quality productive forces of enterprises.

Based on the above conclusions, the following insights can be drawn. Firstly, enterprises should attach importance to the role of fulfilling ESG responsibilities in improving their new quality productive forces, formulate specific ESG strategies and action plans, and ensure that these actions can effectively translate into productivity improvement. Secondly, design a reasonable executive compensation incentive mechanism to strengthen the positive impact of fulfilling ESG responsibilities on the company's new quality productive forces. Consider incorporating ESG performance into the executive performance evaluation system to ensure the commitment and implementation of ESG goals by senior management. Thirdly, the government can formulate and implement policy frameworks that are conducive to ESG development, clarifying specific requirements and standards for corporate ESG responsibility, mandatory requirement for companies to disclose ESG related information according to unified standards to enhance transparency and comparability, and provide incentives such as financial subsidies, tax reductions and low interest loans to encourage enterprises to carry out green transformation and technological innovation. These measures help to build a policy environment conducive to sustainable development of enterprises, thereby promoting the improvement of new quality productive forces.

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