

Article

Can Innovation Improve Corporate ESG Performance? The Moderating Effect of Internal and External Incentives

Xiaoxia Jia and Weiyi Guang *

Business School, University of Shanghai for Science and Technology, Shanghai 200093, China; shlgjxx@usst.edu.cn
* Correspondence: 233531296@st.usst.edu.cn; Tel.: +86-15504215007

Abstract: ESG (Environmental, Social, and Governance) performance is an essential indicator for measuring the sustainability of corporations. It has received increased attention from capital market participants after the proposal of the ‘dual carbon’ goal. Innovation is a necessary skill for corporations to compete in the market. Therefore, this study investigates the impact of innovation on the ESG performance of corporations based on the dual incentive perspective of government subsidies and equity incentives. Using data of China’s A-share main board listed corporations from 2017 to 2022, OLS (Ordinary Least Squares) models are constructed to conduct empirical research. The results show that enhanced innovation can significantly improve corporate ESG performance. This paper also conducts other tests to ensure the robustness of the findings and address potential endogeneity issues. Further analysis shows that both using government subsidies as external incentives and using equity incentives as internal incentives can positively moderate the above findings. Heterogeneity analyses discover that government subsidies granted to asset-advantaged corporations have a more substantial moderating effect than those granted to asset-weakened corporations; equity incentives granted to core technical staff have a more substantial moderating effect than those granted to executives. The concept that innovation with dual incentives can enhance corporate ESG performance can aid in developing programs to improve their ESG performance and generate novel ideas for high-quality, sustainable development.

Keywords: innovation; ESG performance; government subsidies; equity incentives; sustainable development



Citation: Jia, X.; Guang, W. Can Innovation Improve Corporate ESG Performance? The Moderating Effect of Internal and External Incentives. *Sustainability* **2024**, *16*, 6582. <https://doi.org/10.3390/su16156582>

Academic Editor: Gaetano della Corte

Received: 27 June 2024

Revised: 25 July 2024

Accepted: 30 July 2024

Published: 1 August 2024



Copyright: © 2024 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Given ongoing global trade frictions, intensifying geopolitical conflicts, and frequent extreme weather events, it is crucial for corporations to achieve high-quality, sustainable development [1]. The demand for nonfinancial information, such as socially responsible reports or ESG reports, continues to rise as the focus on sustainable corporate investing increases [2]. About 50 percent of corporations registered with the U.S. SEC (Securities and Exchange Commission) provide sustainability information in their regulatory filings [3]. The E.U. (European Union) has finalized CSRD (the Corporate Sustainability Reporting Directive), which will impose more detailed sustainability reporting requirements on E.U. corporations to meet investor demand [4]. In China, especially after the “dual-carbon” goal was proposed, the use of ESG performance as a measure of corporate sustainability has also received widespread attention [4]. The construction of the ESG system has officially entered an accelerated period of development due to the dual impetus of Chinese regulators and the capital market. The number of A-share main board listed corporations voluntarily disclosing ESG or social responsibility reports has been increasing. In the whole year of 2022, 1455 corporations disclosed ESG or social responsibility reports in the A-share market, with a disclosure rate of 28.65%. The disclosure rate of ESG or social responsibility reports of industries, including mining, electricity, heat, gas, and water production and supply, and many other energy-consuming industries, has exceeded 50%.

Based on the above statement, corporations in today's market environment should not only limit their sights to maximizing profits when setting business objectives but should also thoroughly consider the interests of external stakeholders [5], i.e., corporations should be responsible not only to shareholders and creditors but also to external stakeholders, such as consumers, governmental departments, local residents, the media, and environmental protection groups [6]. According to the stakeholder theory, corporations can realize the convergence of their interests and the interests of external stakeholders by assuming more social responsibility and ultimately achieving sustainable development [7,8]. On the one hand, the survival and development of corporations need to be supported by external stakeholders [9], and harming their interests will inevitably fail to produce positive feedback; on the other hand, in the capital market, where ESG performance is the benchmark, potential investment institutions and the public pay more attention to the performance of corporations in terms of environment, society, and governance [10,11]. Scholars have conducted numerous studies on the relationship between ESG performance and corporate governance in various aspects. More and more studies show that the ESG performance of a corporation has a direct impact on its investment performance, financing difficulty [12], and corporate performance [13,14] and even affects the stability of the capital market on a macro level [15]. From a long-term perspective, the better the ESG performance of a corporation, the stronger its sustainable development ability [16]. Therefore, improving corporations' ESG performance has become a new topic that deserves the attention of researchers [17,18]. However, at this stage, most of the research stays at the level of proving the usefulness of ESG performance, and there is less research on the methods to improve the ESG performance of corporations. Most of the studies on how to improve corporate ESG performance remain at the macro level. Abdullah et al. believe that reducing geopolitical risks will improve corporate ESG performance [19], Abakah et al. believe that reducing monetary policy uncertainty will improve ESG performance [20], and Jiang et al. believe that green credit policies will improve ESG performance [21]. There are also a few studies that analyze the ways to improve corporate ESG performance at the micro level. Zhang et al. argue that foreign ownership can effectively improve corporate ESG performance [22], and Cohen et al. argue that granting ESG compensation to executives can effectively improve corporate ESG performance [23].

As the world's second-largest economy, China is undergoing a critical transformation from 'Made in China' to 'Created in China' [24]. Innovation has become a core competitiveness for corporations to maintain high-quality and sustainable development [25]. It is worth researching whether improving innovation can enhance the ESG performance of corporations. Meanwhile, to boost the innovation of corporations, the government offers a range of subsidies, while corporations themselves create equity incentives for executives and key technical staff. Can these dual incentives effectively enhance the relationship between corporation innovation and its ESG performance? Additionally, is there a varying moderating effect of government subsidies for different grant recipients? Does the moderating effect of equity incentives differ among employees? Conducting an in-depth study of these questions can enhance ESG performance, thereby improving the corporate ability to achieve high-quality, sustainable development.

The results of the empirical study conducted in this paper by constructing an OLS model indicate that innovation plays a vital role in enhancing corporate ESG performance. Further research shows that both government subsidies and equity incentives positively moderate the benchmark regression. The heterogeneity test shows that government subsidies granted to asset-advantaged corporations moderate stronger than those granted to asset-weakened corporations, and equity incentives granted to core technical staff moderate stronger than those granted to senior executives.

The marginal contributions of this paper are mainly in the following three aspects. First, this paper explores the impact of corporate innovation on ESG performance. A large number of research results are sufficient to illustrate the importance of ESG performance for corporate sustainable development, and how to improve ESG performance has become an

issue of concern, which is further enriched in this research direction in this paper. Second, this paper considers the important moderating role of internal and external dual incentives in studying the relationship between innovation capability and corporate ESG performance. At the government level, the government has increased subsidies to corporations in recent years to ensure the overall high-quality and sustainable development of the capital market; at the corporation level, corporations have also increased equity incentives for managers and key technical staff to ensure their survival and advancement in the fierce market competition. Third, this paper found that there are apparent differences in the moderating effect of giving incentives to different objects on the main effect, which is manifested in the fact that the moderating effect of giving government subsidies to asset-advantaged corporations is significantly better than that of asset-weakened corporations and that the moderating effect of giving equity incentives to core technical staff is significantly better than that of senior executives, which is a discovery that provides a new idea for the formulation of government subsidy and equity incentive policies.

2. Literature Review and Research Hypothesis

2.1. Innovation and Corporate ESG Performance

While traditional economic studies tend to focus on profit maximization as the only goal of corporations, Friedman suggested in the 1970s that the social responsibility of corporations is to maximize profits while complying with legal and ethical rules [26]. The idea that, in a free corporation system, corporate managers must be accountable to shareholders and satisfy their demands is a view that has been widely accepted in the capital market over the past few decades, but it has notable pitfalls. Capitalists overly focused on self-interest may be tempted to lower the quality of their products, exploit the rights of their employees, and ignore the impact on the environment. With the growing awareness of social responsibility and the role of the market selection mechanism, the external stakeholders are paying more and more attention to the possible impact of business activities on environmental, social, and governance factors, and investors and consumers are willing to sacrifice some of the benefits or costs to support the adoption of environmentally friendly technologies and improve workers' rights [27,28]. The concept of ESG was first introduced by the United Nations Global Compact in a report in 2004.

Unlike traditional financial indicators, which only measure corporate operational performance, ESG has a certain degree of externalities [29], and according to neoclassical economic theory, externalities can have a negative impact on corporate operations; however, more and more research has found that in the asymmetric information environment, the better the corporate ESG performance, the easier it is to gain the trust of external stakeholders [30]. As the epitome of sustainability at the corporate level, ESG aims to take into account the impact of environmental, social, and governance factors on corporate ability to achieve sustainable development in the medium to long term.

Most of the existing research on the factors affecting corporate ESG performance focuses on the macro-control level, such as climate risk [31], environmental protection in specification [32], and tax system greening [33], and there are fewer studies on how to improve ESG performance from the corporate level. In the face of the return of high-end manufacturing industries and the challenge of the low-cost advantage of late-developing countries, the key to maintaining high-quality and sustainable development of Chinese corporations lies in their ability to innovate, and the vital yardstick to measure whether corporations ensure high-quality and sustainable development is their ESG performance. Based on existing research and the definitions of ESG rating standards by mainstream ESG organizations, this paper argues that corporate innovation can significantly improve ESG performance for the following reasons.

First, as a major player in the market economy, corporations inevitably have a negative impact on the environment in the process of value creation through resource utilization [34]. Chinese corporations should seize the development opportunity to accelerate the green transformation at the historical node of the alternation of old and new dynamics, and the

critical point of green transformation lies in innovation. According to the resource-based theory [35], green technological capability refers to the valuable, scarce, and irreplaceable necessary green technological resources owned by corporations, which are manifested explicitly in the form of technicians, advanced equipment, and patented knowledge [36]. The integration and innovation of these resources can improve the efficiency of energy utilization and reduce energy consumption from the root, further improve the final environmental protection ability, and ultimately reduce the level of environmental pollution.

Second, after the corporation innovation project completes its transformation from the research stage to the development stage, it is more likely to produce new green products or new patents, which will, to a certain extent, make the corporate products heterogeneous from other products of the same type [37], form technological barriers, and gain more market attention, thus enabling the corporation to have more substantial market competitiveness. In the long run, increased market competitiveness will bring increased economic benefits to the corporation so that the corporation will have more energy to focus on product quality, improve employee welfare, and devote itself to social philanthropy.

Third, according to the higher-order theory, the behavioral decisions of corporations are influenced by the experience, values, and personality of corporate executives, i.e., the cognitive level of governance and management greatly determines whether the corporation is able to achieve economic benefits while paying attention to the sustainable development of green innovation. Therefore, based on the Smile Curve Theory, on the one hand, increasing green innovation can help reduce the cost of the corporation and increase the value added of the corporation, which is responsible for the stakeholders [38]; on the other hand, increasing investment in innovation can be realized through the acquisition of corporate brands, which can harvest the value of technology as well as strategic assets including management ability and serviceability, and thus lead to the improvement of the corporate governance ability [39].

In order to measure the innovation of corporations more comprehensively, this paper selects three indicators to measure innovation: innovation input, innovation output, and innovation sustainability.

Innovation input is the starting point for innovation activities. According to the resource-based theory, the key for corporations to develop sustainability lies in the introduction of valuable, scarce, irreplaceable, and critical technological resources in the form of skilled personnel, advanced equipment, and proprietary knowledge, among others [40]. The introduction of such resources requires adequate financing, and innovation input is a crucial explanatory factor in measuring the willingness and ability of corporations to innovate [41].

Innovation output is the achievements of innovation activities. Innovation output increases the knowledge accumulation of a corporation, and the higher the innovation output of a corporation, the more resources it has available for its own use. A corporation with independently developed innovative products can not only meet the demand for advanced technology in production but also meet the government's mandatory environmental regulations [42].

Innovation sustainability reflects the continuity and long-term nature of corporate innovation because corporation innovation activities, especially high-quality innovation, often take a long time to carry out, have a high degree of uncertainty, and have a high demand for corporate capital, so the test of whether corporate innovation is sustainable or not can prove that innovation can effectively contribute to improving the level of corporate ESG [43].

Based on the above analysis, this paper proposes Hypotheses 1a, 1b, and 1c.

H1a. *Increased innovation input can improve corporate ESG performance.*

H1b. *Increased innovation output can improve corporate ESG performance.*

H1c. *Increased innovation sustainability can improve corporate ESG performance.*

2.2. Innovation, Government Subsidies, and Corporate ESG Performance

The economic discussion of government subsidies first appeared in the 1920s in Pigou's Welfare Economics. Pigou believed that since the market can never reach a state of perfect competition, social resources cannot naturally reach the optimal state of allocation, and at this time, government intervention is necessary. The government, in the form of subsidies to producers, helps the entire capital market achieve a relative state of equilibrium [44]. Since the development of government subsidies, R&D (Research and Development) subsidy programs for corporations in various countries around the world have basically formed a perfect system. Especially in the world's scientific and technological powerhouses, government subsidy programs have achieved considerable results after a long period of practice. Although the Chinese government started its government subsidy program relatively late, it has been more efficient in policy formulation and implementation. In recent years, the Chinese government has implemented a series of subsidy programs with broad coverage, taking complete account of the country's national conditions [45].

Government subsidies can provide corporations with direct financial support for innovation and have the attribute of resources, especially for corporations in fierce market competition and with high-intensity R&D needs [46]. From the perspective of resource supply, government subsidies provide corporations with direct and indirect financial support [47], which reduces the marginal cost of corporate investment in innovation and reduces the risk of delaying or suspending research and development due to cash flow shortage. From the perspective of signaling theory, government subsidies release positive signals for investors, consumers, and other stakeholders and enhance market confidence, especially for corporations with financing needs; the more serious the information asymmetry, the higher the financing constraints faced by the corporation, so the government subsidies to a large extent reduce the doubts of external institutions and the operating ability of the corporation and reduce the information gap between the two [48]. Based on the above analysis, this paper suggests that government subsidies may have a positive effect on the relationship between innovation capability and the ESG performance of corporations. Based on the above analysis, this paper proposes Hypothesis 2.

H2. *Government subsidies can enhance the positive impact of innovation on corporate ESG performance.*

2.3. Innovation, Equity Incentives, and Corporate ESG Performance

Equity incentives enable employees to form a community of interest with the corporation, promote the long-term stable development of the corporation, reduce agency costs, and inhibit the short-sighted behavior of managers [49]. China's equity incentives have begun to develop vigorously since the implementation of the "Administrative Measures for Enterprise Equity Incentives (Implementation)" in 2006. By analyzing the equity incentive programs of corporations in recent years, it can be found that the main beneficiaries of equity incentives are executives and core technical staff, and at the present time, when innovation has become one of the most important components of productivity of corporations, the strength of corporate equity incentives has shown a trend of overall improvement, with the proportion of equity incentives for the core technical business personnel increasing significantly.

For corporate executives as policymakers, their will directly affects the development path of the corporation to a large extent [50]; however, based on the principal-agent theory and the management defense hypothesis, in the case of asymmetric information between managers and governors, managers may neglect the cultivation of the sustainable development ability of the corporation for the purpose of pursuing its own interest maximization [51]. Giving executives equity incentives and tying their interests to the corporation can, to a certain extent, avoid the short-sightedness of executives and effectively

encourage them to take the long-term interests of the corporation into account when making strategic decisions [52]. For the core technical staff, equity incentives are the main force of innovation. Core technical staff are the source of corporation value creation, and they play an important role in every process of R&D and directly affect the conversion efficiency of R&D inputs and the quality of the final results. The granting of equity incentives to the core technical staff is conducive to the cultivation of their sense of ownership and the enhancement of their innovation ability, which further promotes the positive development of the corporation [53]. Based on the above analysis, this paper proposes Hypothesis 3.

H3. *Equity incentives can enhance the positive impact of innovation on corporate ESG performance.*

2.4. Government Subsidies for Corporations of Different Sizes

Existing studies have shown that the role of government subsidies varies considerably depending on who they are granted to. It has been argued that, based on Schumpeter's Hypotheses [54], the market power of asset-advantaged corporations ensures that government subsidies can adequately improve the efficiency and quality of innovation, whereas asset-weakened corporations are less motivated and conduct R&D mainly for the purpose of obtaining financial support from government subsidies. It is also argued that asset-weakened corporations are, in principle, more in need of government subsidies than asset-advantaged corporations because they are more financially constrained and more willing to undertake innovative R&D activities to improve their competitiveness [55]. This paper argues that, in terms of capital thickness, asset-advantaged corporations have completed the original accumulation of capital after development and innovation, while most asset-weakened corporations are in the initial stage of development and have a relatively large demand for capital; in terms of technological capabilities, asset-advantaged corporations have strong capital as a guarantee, compared with asset-weakened corporations, which are more capable of focusing on innovative R&D. Therefore, this paper proposes Hypothesis 4.

H4. *There is a stronger moderating effect of government subsidies for asset-advantaged corporations than for asset-weakened corporations.*

2.5. Corporation Equity Incentives for Different Employees

Most corporations that implement equity incentive policies mainly benefit from executives and core technical staff, and this paper argues that the impact of equity incentives on them is somewhat different. On the one hand, with core technical staff, as a direct participant in innovation work, their behavior will directly affect the corporate innovation ability and the efficiency of result transformation [56]; at the same time, additional conditions of the equity incentive policy force the core technical staff to wait for a certain period of time before unlocking the equity; this practice also reduces the mobility of core technical personnel, which is beneficial to the development of the long-term innovation work [57]. On the other hand, the indicators to measure the ability of the executive include not only the innovation ability, but also the profitability and the stock price, and the temporary fluctuation of the performance of the stock price may put short-term pressure on the executives [29], and in this case, the executives may not fully focus their work on the R&D. Therefore, granting equity incentives to core technical staff may make a greater degree of positive contribution to the relationship between innovation capability and the ESG performance of corporations. Therefore, this paper proposes Hypothesis 5.

H5. *There is a stronger moderating effect of corporation equity incentives for core technical staff than for executives.*

The framework of this study is shown in Figure 1.

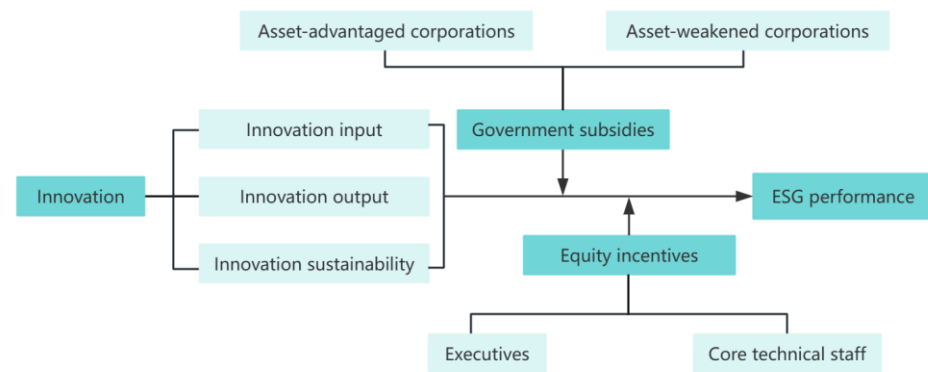


Figure 1. The relationship between innovation, dual incentives, and ESG performance.

3. Research Design

3.1. Data

This paper takes A-share main board listed corporations from 2017 to 2022 as the research sample. Considering the accuracy of the data, this paper has processed the sample data as follows: (1) excluding the data of ST (Special Treatment, risk warning) corporations and *ST (delisting risk warning) corporations; (2) excluding the data not included in CSMAR (Chinese Research Data Services); (3) excluding the data of non-capitalized R&D expenditure. After the above screening, a total of 5127 observations are obtained in this paper; ESG data are from the Huazheng ESG rating database, patent data are from CNRDS (Chinese Research Data Services), and all other data are from the CSMAR.

3.2. Variable Definition

3.2.1. Dependent Variable

ESG performance (ESG). ESG performance consists of three different dimensional measures: Environmental, Social, and Governance. The breakdown indicators of mainstream ESG organizations are somewhat different, but the overall difference is not significant. Referring to the previous research experience and combined with the research content of this paper, we choose the Huazheng ESG rating system [58,59], which gives nine grades of “AAA-C” rating to the evaluated subject, and the corresponding value of this paper is 9 to 1. The higher the score, the better the ESG performance of the evaluated subject [24]. The Huazheng ESG rating system draws on the core essence of international ESG, combines the current situation of China’s information disclosure and corporate characteristics, and builds a top-down evaluation system. The reason why we chose The Huazheng ESG Rating System is because it covers all A-share main board listed corporations and is the mainstream ESG rating system in China.

3.2.2. Dependent Variables

Innovation (INN). In order to take into account the reliability of empirical evidence and data availability, this paper comprehensively measures corporate innovation (INN) from three aspects: innovation input (INNI) [60], innovation output (INNO) [61], and innovation sustainability (INNS). The natural logarithm of the amount of R&D investment plus one was used as a measure of INNI (In empirical research, taking the natural logarithm after adding one can avoid the meaningless scenario of directly taking the natural logarithm of variables with a value of 0, preserve the economic significance of the variables, facilitate comparison and analysis, and maintain the normality of the data, with the same below.); the natural logarithm of the number of patents filed in the year plus one was used as a measure of INNO; and the natural logarithm of the incremental intangible assets of the corporation in the year plus one was used as a measure of INNS.

3.2.3. Control Variables

This paper selected corporation profitability (ROA), corporation age (AGE), type of audit opinion (OPI), type of shareholding (SOE), and equity concentration (TOP1) as control variables in this paper. ROA is measured by the ratio of net income to balance sheet total; AGE is measured by the natural logarithm of the number of years the corporation has been in existence; OPI takes the value of 1 if it is an unqualified opinion and 0 otherwise; SOE takes the value of 1 if it belongs to the government shareholding and 0 otherwise; and TOP1 is measured by the proportion of shares held by the first largest shareholder.

3.2.4. Moderator Variables

Government subsidies (SUB) and equity incentives (E.I.). The study of incentive policy should fully consider both the internal and external perspectives of the corporation. Government subsidies provide external incentives for the corporation, and equity incentives provide internal incentives for managers and key technical staff, so this paper selected government subsidies and equity incentives as moderator variables. In this paper, the amount of government subsidies reported in the annual reports of corporations is used as a measure of the incentive role of government subsidies, and the total number of shares issued for stock incentives reported in the table of stock incentive programs of corporations is used as a measure of the incentive role of stock incentives. In order to reduce the impact of heteroskedasticity on the empirical results, the natural logarithm of the above two indicators plus one is taken as the measure, with all variables defined in Table 1.

Table 1. Definition and measurement of variables.

Variable	Definition
ESG	Huazheng ESG Rating Index
INNI	LN (R&D expenditure + 1)
INNO	LN (Number of patents + 1)
INNS	LN (End-of-year intangible assets—Beginning-of-year intangible assets + 1)
SUB	LN (Government subsidies + 1)
EI	LN (Total number of shares for equity incentive + 1)
ROA	Net profit divided by total asset balance
AGE	LN (Years since the establishment of the corporation + 1)
OPI	The unqualified audit opinion is coded as 1, otherwise 0
SOE	A state-owned corporation is coded as 1, otherwise 0
TOP1	The proportion of shares held by the largest shareholder

3.3. Model

To test the empirical relationship between innovation capability and corporate ESG performance, model (1) is constructed:

$$ESG_{i,t} = \alpha_0 + \alpha_1 INN_{i,t} + \sum \alpha_n Controls_{i,t} + Industry + Year + \varepsilon_{i,t} \quad (1)$$

$ESG_{i,t}$ represents corporate ESG performance; $INN_{i,t}$ represents corporate innovations (including $INNI_{i,t}$, $INNO_{i,t}$, and $INNS_{i,t}$); $Controls_{i,t}$ represents a set of control variables; the subscript i represents individual stocks; the subscript t represents the period; $Industry$ represents industry fixed effects; $Year$ represents time fixed effects; $\varepsilon_{i,t}$ represents the random error term; α represents a coefficient.

To test the effect of incentive policies on the relationship between innovation and corporate ESG performance, two moderating variables, government subsidies (SUB) and equity incentives (E.I.), and their interaction terms with innovation are included in models (2) and (3):

$$ESG_{i,t} = \beta_0 + \beta_1 INN_{i,t} + \beta_2 SUB_{i,t} + \beta_3 INN_{i,t} \times SUB_{i,t} + \sum \beta_n Controls_{i,t} + Industry + Year + \varepsilon_{i,t} \quad (2)$$

$$ESG_{i,t} = \beta_0 + \beta_1 INN_{i,t} + \beta_2 EI_{i,t} + \beta_3 INN_{i,t} \times EI_{i,t} + \sum \beta_n Controls_{i,t} + Industry + Year + \varepsilon_{i,t} \quad (3)$$

$SUB_{i,t}$ represents government subsidies; $EI_{i,t}$ represents equity incentives; $INN_{i,t} \times SUB_{i,t}$ represents the interaction term between innovation and government subsidies; $INN_{i,t} \times EI_{i,t}$ represents the interaction term between innovation and equity incentives; β represents a coefficient, with the remaining symbols having the same meaning as model (1).

4. Results

4.1. Descriptive Statistics

Table 2 shows the descriptive statistics of the main variables of the sample corporations. The mean of the explanatory variable ESG performance (ESG) is 4.189, the median is 4.000, and the mean is larger than the median, indicating a right-skewed distribution phenomenon; the standard deviation is 1.164, and the mean corresponds to the ratings between BBB and B.B., indicating that the ESG performance of corporations as a whole is reasonably good, but a large number of corporations still have room for improvement.

Table 2. Descriptive statistics.

Variable	N	Mean	SD	Min	Median	Max
ESG	5127	4.189	1.164	1.000	4.000	8.000
INNI	5127	18.850	1.495	11.640	18.800	24.050
INNO	5127	2.114	1.858	0.000	2.079	9.577
INNS	5127	11.180	8.561	0.000	16.150	24.670
SUB	5127	17.160	2.352	0.000	17.270	23.230
EI	5127	2.674	6.083	0.000	0.000	21.28
ROA	5127	0.024	0.100	−2.120	0.0310	0.759
AGE	5127	0.370	0.483	0.000	0.000	1.000
OPI	5127	0.970	0.171	0.000	1.000	1.000
SOE	5127	3.028	0.281	1.792	3.045	3.970
TOP1	5127	0.310	0.148	0.0180	0.288	0.891

4.2. Test of Correlation Coefficient

Table 3 shows the results of correlation coefficient tests among the explanatory variables, core explanatory variables, moderating variables, and control variables, which show that the correlation coefficients among the variables are less than 0.5, i.e., there is no multicollinearity problem among all the variables in this paper. Among them, the correlation coefficients between the three core explanatory variables and the explained variables are 0.279, 0.241, and 0.142, respectively, which are all significant at the 1% level. Therefore, the selection of the core variables in this paper is reasonable.

Table 3. Test of the correlation coefficient.

Variable	ESG	INNI	INNO	INNS	SUB	EI	ROA	SOE	OPI	AGE	TOP1
ESG	1										
INNI	0.279 ***	1									
INNO	0.241 ***	0.410 ***	1								
INNS	0.142 ***	0.200 ***	0.096 ***	1							
SUB	0.183 ***	0.441 ***	0.214 ***	0.130 ***	1						
EI	0.065 ***	0.090 ***	0.077 ***	0.079 ***	0.042 ***	1					
ROA	0.178 ***	0.095 ***	0.076 ***	0.116 ***	0.039 ***	0.059 ***	1				

Table 3. Cont.

Variable	ESG	INNI	INNO	INNS	SUB	EI	ROA	SOE	OPI	AGE	TOP1
SOE	0.146 ***	0.120 ***	0.038 ***	0.002	0.102 ***	−0.130 ***	0.0210	1			
OPI	0.167 ***	0.084 ***	0.067 ***	0.071 ***	0.053 ***	0.027 *	0.281 ***	0.071 ***	1		
AGE	−0.021	0.038 ***	−0.091 ***	−0.046 ***	0.040 ***	−0.037 ***	−0.024 *	0.190 ***	−0.036 ***	1	
TOP1	0.124 ***	0.040 ***	0.0120	0.032 **	0.040 ***	−0.054 ***	0.149 ***	0.312 ***	0.087 ***	−0.056 ***	1

Note: *, **, and *** are statistically significant at 10%, 5%, and 1% respectively.

4.3. Baseline Regression Result

Based on Model 1, Model 2, and Model 3, Table 4 presents the results of the baseline regressions on the impact of innovation on corporate ESG performance. Columns (1)–(3) show the relationship between innovation and corporate ESG performance without the addition of control variables; columns (4)–(6) show the relationship between innovation and corporate ESG performance with the addition of control variables. The results show that the coefficients of innovation input capability (INNI), innovation output capability (INNO), and innovation sustainability capability (INNS) are all significantly positive at the 1% level with or without the addition of control variables. The regression results support Hypothesis 1a, 1b, and 1c.

Table 4. Results of baseline regression.

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	ESG	ESG	ESG	ESG	ESG	ESG
INNI	0.280 *** (16.522)	0.248 *** (14.482)				
INNO			0.192 *** (13.468)	0.170 *** (12.280)		
INNS					0.018 *** (8.357)	0.015 *** (6.958)
ROA		1.410 *** (4.797)		1.492 *** (5.119)		1.610 *** (5.115)
AGE		0.152 ** (2.660)		0.225 *** (3.854)		0.278 *** (4.658)
OPI		0.705 *** (5.498)		0.722 *** (5.473)		0.757 *** (5.692)
SOE		−0.134 (−1.546)		−0.057 (−0.653)		−0.111 (−1.211)
TOP1		0.364 * (2.061)		0.375 * (2.128)		0.447 * (2.395)
Constant	−1.096 *** (−3.431)	−0.967 * (−2.227)	3.784 *** (99.222)	3.068 *** (10.084)	3.985 *** (110.697)	3.345 *** (10.486)
Industry Effect	YES	YES	YES	YES	YES	YES
Year Effect	YES	YES	YES	YES	YES	YES
Observations	5110	5110	5110	5110	5110	5110
Adj. R ²	0.216	0.210	0.172	0.216	0.210	0.172

Note: *, **, and *** are statistically significant at 10%, 5%, and 1%, respectively. The content in parentheses is *t*-value.

4.4. Robustness Test and Endogeneity Treatment

4.4.1. Replacing Regression Models

In order to reduce the risk of conclusions that may exist when using a single model, this study uses the Ologit model in the robustness test [62]. The reason for using the Ologit model is that the dependent variable in this study, ESG performance, is an ordered

dependent variable, and the Ologit model is suitable for the construction of a model with ordered dependent variables. Columns (1)–(3) of Table 5 show the regression results of replacing the regression model, and the test results show that replacing the model does not affect the robustness, so the conclusions of the baseline regression still hold.

Table 5. Results of robustness test.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ESG	ESG	ESG	ESG	ESG	ESG	ESG
INNI	0.455 *** (21.383)				0.232 *** (14.146)		
INNO		0.317 *** (19.280)				0.161 *** (12.179)	
INNS			0.024 *** (7.543)				0.014 *** (7.531)
INNI1				0.110 *** (8.595)			
Control variables	YES	YES	YES	YES	YES	YES	YES
Constant	—	—	—	1.677 *** (4.500)	−0.876 * (−2.127)	3.009 *** (10.945)	3.182 *** (11.084)
Industry/Year Effect	YES	YES	YES	YES	YES	YES	YES
Observations	5112	5112	5112	5110	6399	6399	6399
Adj. R ²	0.082	0.076	0.056	0.214	0.204	0.180	0.145

Note: *, and *** are statistically significant at 10%, 5%, and 1%, respectively. The content in parentheses is *t*-value.

4.4.2. Replacing Independent Variables

As mentioned above, R&D expenditure has a positive impact on corporate ESG performance, but it is worth noting that R&D inputs can be divided into current expenditure and capitalized expenditure, and generally speaking, only capitalized R&D inputs can be applied to actual production or sales and bring substantial inflow of economic benefits to corporations [63]. Therefore, this paper reconstructs the model using capitalized R&D investment (INNI1). Column (4) of Table 5 shows the regression results of replacing independent variables, which are basically the same as the baseline regression results.

4.4.3. Extending the Sample Interval

The baseline regression part is selected from the 2017 to 2022 corporation data to exclude the successive introduction of the *Environmental Protection Tax Law* (25 December 2016), *Carbon Emissions Trading Management Measures (Trial)* (1 February 2021), and other regulations in recent years, which may have an uncertain impact on the relationship between innovation and ESG performance; this paper extends the research sample space in the robustness test and selects the corporation data from 2015 to 2022 instead, and the regression results are shown in column (5)–column (7) of Table 5. The test results do not change significantly due to the change in the sample interval.

4.4.4. Dependent Variables Lagged by One Year

To address the potential endogeneity issues in the baseline regression, this study adopts a lagged treatment approach for the dependent variable. Specifically, the core explanatory variables for the current year are used to predict the corporate ESG performance for the following year. The reasons for this approach are twofold. Firstly, it is recognized that the impact of enhancing innovation on corporate ESG performance may exhibit a certain degree of lag. Secondly, lagging the dependent variable by one period creates a temporal mismatch between the independent and dependent variables, thus partially mitigating the endogeneity issues arising from reverse causality. The regression results in Table 6 indicate that the coefficients of all core explanatory variables are significantly positive at the 1% level. Thus, the conclusions of the baseline regression still hold.

Table 6. Results of dependent variables lagged by one year.

Variable	(1)	(2)	(3)
	ESG	ESG	ESG
INNI	0.250 *** (14.018)		
INNO		0.174 *** (12.072)	
INNS			0.015 *** (6.732)
Control variables	YES	YES	YES
Constant	−0.971 * (−2.143)	3.096 *** (9.749)	3.382 *** (10.128)
Industry/Year Effect	YES	YES	YES
Observations	4396	4396	4396
Adj. R ²	0.220	0.205	0.158

Note: * and *** are statistically significant at 10% and 1%, respectively. The content in parentheses is *t*-value.

4.4.5. Instrumental Variable Method

This paper may have the following two problems, leading to endogeneity. First, the main regression analyzes the impact of innovation on corporate ESG performance with innovation as the independent variable, but in reality, some corporations may have better ESG performance even if they do not focus on cultivating innovation due to the industry and life cycle; second, there may be a bidirectional causality between innovation and corporate ESG performance, i.e., the better the ESG performance, the more likely it is that the corporations will receive more investment and financing opportunities, and the more resources can be invested in improving innovation. Therefore, this paper uses principal component analysis to fit the core explanatory variables and finally selects the average of R&D expenditure and total assets in the same industry and in the same year, *INN_1*, as the instrumental variable of *INN* of innovation capability, and constructs models (4) and (5):

$$INN_{1i,t} = \gamma_0 + \gamma_1 INN_{i,t} + \sum \gamma_n Controls_{i,t} + Industry + Year + \varepsilon_{i,t} \quad (4)$$

$$ESG_{i,t} = \gamma_0 + \gamma_1 \hat{INN}_{1i,t} + \sum \gamma_n Controls_{i,t} + Industry + Year + \varepsilon_{i,t} \quad (5)$$

The regression results in Table 7 show that in the first stage, *INN_1* is significantly positive at the 1% level, with a Cragg–Donald Wald F value of 17.310 and a Kleibergen–Paap rk Wald F value of 26.520, both greater than 10, and in the second stage, *INN_1* is significantly positive at the 1% level, with a Cragg–Donald Wald F value of 17.310 and a Kleibergen–Paap rk Wald F value of 26.525, both greater than 10. Thus, the conclusions of the baseline regression still hold.

Table 7. The results of the instrumental variable method.

Variable	(1)	(2)
Panel A: First-stage regression		
<i>INN_1</i>	24.037 *** (5.150)	
Panel B: Second-stage regression		
<i>INN_1</i>		0.724 *** (2.970)
Controls	YES	YES
Kleibergen–Paap rkLM-P value	0.000	0.000

Table 7. Cont.

Variable	(1)	(2)
Cragg–Donald Wald F value	17.310	17.310
Kleibergen–Paap rk Wald F value	26.520	26.525
Industry Effect	YES	YES
Year Effect	YES	YES
Observations	5110	5110

Note: *** are statistically significant at 1%. The content in parentheses is *t*-value.

5. Further Analysis

5.1. Innovation, Government Subsidies, and Corporate ESG Performance

Based on Model 2, Table 8 presents the results of the regression on the impact of innovation on ESG performance under government subsidy incentives. In order to reduce the impact that non-intrinsic multicollinearity may have on the study, this paper used Zero-center on the independent variables and the moderating variables.

Table 8. The results of the impact of innovation on ESG performance under government subsidies.

Variable	(1)	(2)	(3)
	ESG	ESG	ESG
	INNI × SUB	INNO × SUB	INNS × SUB
INNI	0.223 *** (12.579)		
INNO		0.143 *** (9.944)	
INNS			0.013 *** (6.107)
SUB	0.026 ** (3.192)	0.062 *** (6.242)	0.075 *** (7.210)
Interaction	0.010 * (2.563)	0.013 ** (2.892)	0.002 * (2.217)
ROA	1.401 *** (4.814)	1.435 *** (5.124)	1.542 *** (5.139)
AGE	−0.134 (−1.553)	−0.069 (−0.809)	−0.108 (−1.224)
OPI	0.706 *** (5.506)	0.707 *** (5.367)	0.726 *** (5.516)
SOE	0.154 ** (2.711)	0.210 *** (3.696)	0.253 *** (4.384)
TOP1	0.364 * (2.075)	0.390 * (2.263)	0.439 * (2.432)
Constant	3.693 *** (12.163)	3.468 *** (11.628)	3.542 *** (11.452)
Industry Effect	YES	YES	YES
Year Effect	YES	YES	YES
Observations	5110	5110	5110
Adj. R ²	0.216	0.210	0.172

Note: *, **, and *** are statistically significant at 10%, 5%, and 1%, respectively. The content in parentheses is *t*-value.

The regression results in Table 8 show that the coefficient of the interaction term between innovation input and government subsidies is significant at the 10% level, the coefficient of the interaction term between innovation output and government subsidies is significant at the 5% level, and the coefficient of the interaction term between innovation sustainability and government subsidies is significant at the 10% level. In conclusion, Hypothesis 2 is valid.

To verify the robustness of the innovation and government subsidies interaction term, this study uses three approaches to conduct robustness tests. The first method is to “replace the OLS model with the Ologit model”. The second method is “Extending the Sample Interval”, where we extend the data range from 2017–2022 to 2015–2022. The third method is “Replacing independent variables”, where we reconstruct the model using capitalized R&D investment (INNI1). The results of Table 9 show that the interaction term is still robust in the context of the robustness test; thus, Hypothesis 2 is still valid.

Table 9. Robustness test on the interaction term between innovation and government subsidies.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ESG	ESG	ESG	ESG	ESG	ESG	ESG
INNI	2.091 *** (5.871)			0.212 *** (19.270)			
INNO		0.267 *** (15.229)			0.135 *** (14.668)		
INNS			0.004 ** (3.178)			0.012 *** (7.631)	
INNI1							0.086 *** (10.075)
SUB	0.161 *** (11.535)	0.118 *** (9.075)	0.138 *** (10.788)	0.025 *** (3.759)	0.062 *** (10.139)	0.073 *** (11.892)	0.059 *** (8.456)
Interaction	0.557 ** (2.713)	0.027 *** (4.567)	0.004 ** (3.178)	0.006 * (2.170)	0.011 *** (3.589)	0.002 * (2.546)	0.012 *** (4.170)
ROA	3.477 *** (10.048)	2.877 *** (8.507)	3.108 *** (9.155)	1.550 *** (10.482)	1.602 *** (10.762)	1.697 *** (11.173)	1.597 *** (10.037)
AGE	−0.080 (−0.791)	−0.081 (−0.805)	−0.153 (−1.519)	−0.047 (−0.958)	−0.012 (−0.247)	−0.042 (−0.842)	−0.111 (−1.902)
OPI	1.241 *** (7.595)	1.255 *** (7.663)	1.252 *** (7.651)	0.662 *** (8.181)	0.660 *** (8.098)	0.679 *** (8.171)	0.723 *** (7.917)
SOE	0.453 *** (7.131)	0.349 *** (5.503)	0.428 *** (6.773)	0.178 *** (5.661)	0.245 *** (7.816)	0.273 *** (8.574)	0.214 *** (5.914)
TOP1	0.884 *** (4.402)	0.722 *** (3.594)	0.802 *** (3.998)	0.244 * (2.466)	0.283 ** (2.845)	0.316 ** (3.119)	0.496 *** (4.288)
Constant	—	—	—	3.469 *** (20.119)	3.328 *** (19.171)	3.382 *** (19.146)	3.537 *** (17.334)
Industry Effect	YES	YES	YES	YES	YES	YES	YES
Year Effect	YES	YES	YES	YES	YES	YES	YES
Observations	5112	5112	5112	6399	6399	6399	5110
Adj. R ²	0.064	0.082	0.065	0.206	0.194	0.165	0.184

Note: *, **, and *** are statistically significant at 10%, 5%, and 1%, respectively. The content in parentheses is *t*-value.

5.2. Innovation, Equity Incentives, and Corporate ESG Performance

Based on Model 3, Table 10 presents the results of the regression on the impact of innovation on ESG performance under equity incentives. The current public disclosure of the equity incentive programs of A-share main board listed corporations accounted for a relatively small amount, so there are many data with a value of 0. This type of data for the study has no practical significance, so it has been excluded.

The regression results in Table 10 show that the coefficients of the interaction term between innovation input capacity and corporate equity incentives, the coefficients of the interaction term between innovation output capacity and corporate equity incentives, and the coefficients of the interaction term between innovation sustainability and corporate equity incentives are all significantly positive at the 5% level. Thus, the presence of equity incentives enhances the positive effect of innovativeness on corporate ESG performance. In conclusion, Hypothesis 3 is valid.

Table 10. The results of the impact of innovation on ESG performance under equity incentives.

Variable	(1)	(2)	(3)
	ESG	ESG	ESG
	EI × INNI	EI × INNO	EI × INNS
INNI	0.289 *** (7.624)		
INNO		0.180 *** (6.882)	
INNS			0.012 * (2.370)
E.I.	−0.098 ** (−2.827)	−0.020 (−0.614)	0.028 (0.767)
Interaction	0.054 ** (2.851)	0.045 ** (3.132)	0.010 ** (2.706)
ROA	2.393 *** (4.565)	2.719 *** (5.485)	3.369 *** (6.789)
AGE	0.044 (0.268)	0.066 (0.401)	−0.013 (−0.077)
OPI	0.567 * (2.270)	0.629 * (2.264)	0.636 * (2.362)
SOE	0.275 * (2.428)	0.334 ** (2.876)	0.370 ** (2.944)
TOP1	0.256 (0.775)	0.226 (0.682)	0.203 (0.538)
Constant	3.394 *** (5.983)	3.276 *** (5.517)	3.499 *** (5.690)
Industry Effect	YES	YES	YES
Year Effect	YES	YES	YES
Observations	826	826	826
Adj. R ²	0.209	0.208	0.128

Note: *, **, and *** are statistically significant at 10%, 5%, and 1%, respectively. The content in parentheses is *t*-value.

To verify the robustness of the innovation and equity incentives interaction term, this study uses two approaches to conduct robustness tests. The methodology is the same as in Section 5.1. The results of Table 11 show that the interaction term is still robust in the context of the robustness test. Thus, Hypothesis 3 is still valid.

Table 11. Robustness test on the interaction term between innovation and equity incentives.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ESG	ESG	ESG	ESG	ESG	ESG	ESG
INNI	0.554 *** (9.214)			0.293 *** (7.630)			
INNO		(9.316)			0.185 *** (6.899)		
INNS			0.021 * (2.517)			0.012 *** (7.631)	
INNI1							0.112 *** (4.977)
EI	0.120 * (2.516)	−0.038 (−0.812)	0.031 * (0.799)	0.025 *** (3.759)	0.062 *** (10.139)	0.073 *** (11.892)	−0.009 (−0.284)
Interaction	0.071 * (2.541)	0.042 * (2.418)	0.021 * (2.517)	0.006 * (2.170)	0.011 *** (3.589)	0.002 * (2.546)	0.012 *** (4.170)
ROA	4.314 *** (4.399)	4.929 *** (5.095)	5.882 *** (6.253)	2.397 *** (4.575)	2.722 *** (5.496)	3.364 *** (6.780)	2.397 *** (4.575)

Table 11. Cont.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ESG	ESG	ESG	ESG	ESG	ESG	ESG
AGE	0.151 (0.575)	0.299 (1.141)	0.099 (0.381)	0.045 (0.274)	0.067 (0.407)	−0.016 (−0.094)	0.045 (0.274)
OPI	1.206 * (2.457)	1.281 * (2.543)	1.159 * (2.360)	0.567 * (2.269)	0.629 * (2.264)	0.636 * (2.363)	0.567 * (2.269)
SOE	0.398 * (2.116)	0.605 ** (3.203)	0.669 *** (3.622)	0.274 * (2.433)	0.333 ** (2.881)	0.374 ** (2.993)	0.274 * (2.433)
TOP1	0.706 (1.280)	0.538 (0.986)	0.488 (0.895)	0.261 (0.799)	0.231 (0.705)	0.189 (0.506)	0.261 (0.799)
Constant	—	—	—	3.390 *** (5.982)	3.272 *** (5.519)	3.511 *** (5.719)	3.387 *** (6.348)
Industry Effect	YES	YES	YES	YES	YES	YES	YES
Year Effect	YES	YES	YES	YES	YES	YES	YES
Observations	829	829	829	1005	1005	1005	826
Adj. R ²	0.106	0.108	0.072	0.206	0.194	0.165	0.146

Note: *, **, and *** are statistically significant at 10%, 5%, and 1%, respectively. The content in parentheses is *t*-value.

5.3. Heterogeneity Analysis

5.3.1. Heterogeneity Analysis Based on Government Subsidies

The government subsidy recipients are divided into two types: asset-advantaged corporations and asset-weakened corporations, and group experiments are conducted to verify the moderating effect of segmentation on the main effect. The segmentation method is to take the logarithm after adding 1 to the corporation size. If it is larger than the average, it is classified as an asset-advantaged corporation; if it is smaller than the average, it is classified as an asset-weakened corporation.

The results of the grouping test based on the objects of government subsidies are shown in Table 12. Columns (1)–(3) show the results of the moderating effect of government subsidies on asset-advantaged corporations. The coefficient of the interaction term between government subsidies and innovation input is positive and significant at the 1% level, the coefficient of the interaction term between government subsidies and innovation output is positive and significant at the 5% level, and the coefficient of the interaction term between government subsidies and innovation sustainability is positive and significant at the 5% level. The coefficients are positive and significant at the 5% level. Columns (4)–(6) show the moderating results of government subsidies to asset-weakened corporations, and the coefficients of the interaction terms of government subsidies with innovation input, innovation output, and innovation sustainability do not reach significance at the 10% level. This result suggests that government subsidies to asset-advantaged corporations contribute significantly more positively to the relationship between innovation and corporate ESG performance than government subsidies to asset-weakened corporations. In summary, Hypothesis 4 is supported.

Table 12. The results of heterogeneity analysis based on government subsidy recipients.

Variable	Asset-Advantaged Corporations			Asset-Weakened Corporations		
	(1)	(2)	(3)	(4)	(5)	(6)
	ESG	ESG	ESG	ESG	ESG	ESG
	SUB1 × INNI	SUB1 × INNO	SUB1 × INNS	SUB2 × INNI	SUB2 × INNO	SUB2 × INNS
INNI	0.263 *** (9.204)			0.210 *** (6.975)		

Table 12. Cont.

Variable	Asset-Advantaged Corporations			Asset-Weakened Corporations		
	(1)	(2)	(3)	(4)	(5)	(6)
	ESG	ESG	ESG	ESG	ESG	ESG
	SUB1 × INNI	SUB1 × INNO	SUB1 × INNS	SUB2 × INNI	SUB2 × INNO	SUB2 × INNS
INNO		0.150 *** (7.750)			0.131 *** (6.371)	
INNS			0.013 *** (4.119)			0.009 *** (3.373)
SUB	0.038 ** (3.196)	0.062 *** (4.475)	0.076 *** (5.045)	0.014 (1.096)	0.037 ** (2.772)	0.051 *** (3.917)
Interaction	0.017 *** (3.507)	0.015 ** (2.652)	0.003 ** (2.787)	−0.012 (−1.521)	−0.001 (−0.064)	−0.001 (−0.917)
Control variables	YES	YES	YES	YES	YES	YES
Constant	4.064 *** (7.277)	4.013 *** (7.383)	4.146 *** (7.568)	3.563 *** (9.725)	3.476 *** (9.649)	3.541 *** (9.494)
Industry/Year Effect	YES	YES	YES	YES	YES	YES
Observations	2243	2243	2243	2863	2863	2863
Adj. R ²	0.210	0.206	0.153	0.182	0.181	0.160

Note: ** and *** are statistically significant at 5% and 1%, respectively. The content in parentheses is *t*-value.

5.3.2. Heterogeneity Analysis Based on Corporate Equity Incentive Recipients

Equity incentive recipients are categorized into two types: executives and core technical staff, and group experiments are conducted on them to test the moderating effect on the main effect of segmentation.

The results of the group test based on the equity incentive recipients are shown in Table 13. Columns (1)–(3) show the results of the moderating effect of granting equity incentives to executives on the main effect. The coefficient of the interaction term between equity incentives and innovation input is significantly positive at the 10% level, the coefficient of the interaction term between equity incentives and innovation output is significantly positive at the 10% level, and the coefficient of the interaction term between equity incentives and innovation sustainability is significantly positive at the 5% level. Columns (4)–(6) show the results of the moderating effect of granting equity incentives to core technical staff on the main effect, and the coefficients of the interaction terms of equity incentives and innovation input, equity incentives and innovation output, and equity incentives and innovation sustainability are all significantly positive at the 5% level. This result suggests that granting equity incentives to core technical staff has an overall greater positive contribution to the relationship between innovation capability and corporate ESG performance than granting equity incentives to executives. In summary, Hypothesis 5 is supported.

Table 13. The results of heterogeneity analysis based on corporate equity incentive recipients.

Variable	Executives			Core Technical Staff		
	(1)	(2)	(3)	(4)	(5)	(6)
	ESG	ESG	ESG	ESG	ESG	ESG
	EI1 × INNI	EI1 × INNO	EI1 × INNS	EI2 × INNI	EI2 × INNO	EI2 × INNS
INNI	0.271 *** (7.402)			0.282 *** (7.386)		

Table 13. Cont.

Variable	Executives			Core Technical Staff		
	(1)	(2)	(3)	(4)	(5)	(6)
	ESG	ESG	ESG	ESG	ESG	ESG
	EI1 × INNI	EI1 × INNO	EI1 × INNS	EI2 × INNI	EI2 × INNO	EI2 × INNS
INNO		0.204 *** (7.427)			0.172 *** (6.595)	
INNS			0.012 * (2.200)			0.070 *** (3.841)
EI	−0.014 (−0.410)	0.002 (0.047)	0.008 (0.211)	−0.073 * (−2.087)	0.003 (0.098)	0.053 (1.482)
Interaction	0.047 * (2.075)	0.036 * (2.341)	0.011 ** (2.775)	0.050 ** (2.780)	0.045 ** (3.251)	0.010 ** (2.679)
Control variables	YES	YES	YES	YES	YES	YES
Constant	3.560 *** (5.420)	3.345 *** (4.865)	3.404 *** (4.864)	3.393 *** (5.959)	3.239 *** (5.491)	3.481 *** (5.693)
Industry/Year Effect	YES	YES	YES	YES	YES	YES
Observations	711	711	711	812	812	812
Adj. R ²	0.206	0.209	0.134	0.208	0.214	0.136

Note: *, **, and *** are statistically significant at 10%, 5%, and 1%, respectively. The content in parentheses is *t*-value.

6. Conclusions and Recommendations

6.1. Conclusions

Taking the annual data of A-share main board listed corporations from 2017 to 2022 as the research sample, this paper empirically examines the impact of innovation on corporate ESG performance under the dual incentive perspective and draws the following four conclusions.

First, innovation can positively influence the level of corporate ESG. Second, government subsidies and equity incentives as moderating variables can promote the positive impact of innovation capability on corporate ESG performance. Third, government subsidies granted to asset-advantaged corporations moderated better than government subsidies granted to asset-weakened corporations. Fourth, equity incentives granted to core technical staff moderated better than equity incentives granted to executives.

6.2. Recommendations

Based on the above conclusions, this paper puts forward the following three suggestions.

First, Chinese corporations should fully recognize the positive role of innovation. Innovation can help corporations achieve their production and operation goals and have a beneficial impact on ESG performance. To achieve optimal results, it is important for corporations to consider the entire innovation cycle when developing their strategies. This requires adequate investment in R&D personnel and funding at the initial stage, as well as a commitment to maintaining a consistent approach to innovation over time. This will ensure a reliable source of ideas and solutions over the long term. At the same time, Chinese corporations should consider not only the efficiency of the output of innovative products but also the quality of the output; this will help realize the goal of innovation-driven, high-quality, sustainable development of corporations.

Second, while increasing government subsidies for R&D, government departments should also strengthen the supervision of the use of the funds so as to eliminate the problem of some corporations obtaining government subsidies in the name of initiating R&D projects and increasing innovation and then diverting the funds to other areas. Government departments should emphasize both rewards and penalties, urging corporations to

improve the efficiency of the use of funds to ensure that the government subsidies can be “earmarked”.

Third, corporations should adopt a more rational approach when formulating equity incentive policies, refine the heterogeneity of employees in line with the strategic objectives of the corporation, and fully consider the different effects that equity incentives may have on different groups of people so as to effectively improve the level of corporate ESG. If the corporation is in a critical period of R&D and innovation, it should pay more attention to improving the equity incentive treatment for core technical personnel. At the same time, the unlocking conditions of the equity incentives should be formulated in a relaxed manner; excessively strict unlocking conditions will make the employees fearful, and excessively loose unlocking conditions will not be able to achieve the effect of encouraging innovation and can be based on the industry benchmark corporations and take into account the market environment to formulate the unlocking policy.

Author Contributions: Conceptualization, W.G. and X.J.; methodology, W.G.; software, W.G.; validation, W.G. and X.J.; formal analysis, W.G.; resources, W.G.; data curation, W.G.; writing—original draft preparation, W.G.; writing—review and editing, X.J.; project administration, X.J.; funding acquisition, X.J. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the National Social Science Foundation of China (No. 22BJY199).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Conflicts of Interest: The authors declare no conflicts of interest.

References

- Liu, X.; Yang, Q.; Wei, K.; Dai, P.F. ESG rating disagreement and idiosyncratic return volatility: Evidence from China. *Res. Int. Bus. Financ.* **2024**, *70*, 102368. [[CrossRef](#)]
- Cohen, J.R.; Holder-Webb, L.; Zamora, V.L. Nonfinancial Information Preferences of Professional Investors. *Behav. Res. Account.* **2015**, *27*, 127–153. [[CrossRef](#)]
- Christensen, H.B.; Hail, L.; Leuz, C. Mandatory CSR and sustainability reporting: Economic analysis and literature review. *Rev. Account. Stud.* **2021**, *26*, 1176–1248. [[CrossRef](#)]
- Mulligan, C.; Morsfield, S.; Cheikosman, E. Blockchain for sustainability: A systematic literature review for policy impact. *Telecommun. Policy* **2024**, *48*, 102676. [[CrossRef](#)]
- Otto, G.A.; Driessen, P.H.; Hillebrand, B.; Prasad, R. Antecedents and performance implications of stakeholder understanding in green product innovation. *J. Clean. Prod.* **2023**, *420*, 138174. [[CrossRef](#)]
- Li, Y.; Wang, X.; Zheng, X. Data assets and corporate sustainable development: Evidence from ESG in China. *Pac.-Basin Financ. J.* **2024**, *85*, 102378. [[CrossRef](#)]
- Bénabou, R.; Tirole, J. Individual and Corporate Social Responsibility. *Economica* **2010**, *77*, 1–19. [[CrossRef](#)]
- Kitzmueller, M.; Shimshack, J. Economic Perspectives on Corporate Social Responsibility. *J. Econ. Lit.* **2012**, *50*, 51–84. [[CrossRef](#)]
- Nguyen, T.H.D.; Chileshe, N.; Rameezdeen, R.; Wood, A. Strategic responses to external stakeholder influences. *Int. J. Proj. Manag.* **2023**, *41*, 102434. [[CrossRef](#)]
- Chen, X.; Chen, X.; Xu, L.; Wen, F. Attention to climate change and downside risk: Evidence from China. *Risk Anal.* **2023**, *43*, 1011–1031. [[CrossRef](#)]
- Ren, X.; Ren, Y. Public environmental concern and corporate ESG performance. *Financ. Res. Lett.* **2024**, *61*, 104991. [[CrossRef](#)]
- Mansouri, S.; Momtaz, P.P. Financing sustainable entrepreneurship: ESG measurement, valuation, and performance. *J. Bus. Ventur.* **2022**, *37*, 106258. [[CrossRef](#)]
- Amel-Zadeh, A.; Serafeim, G. Why and How Investors Use ESG Information: Evidence from a Global Survey. *Financ. Anal. J.* **2018**, *74*, 87–103. [[CrossRef](#)]
- Bissoondoyal-Bheenick, E.; Brooks, R.; Do, H.X. ESG and firm performance: The role of size and media channels. *Econ. Model.* **2023**, *121*, 106203. [[CrossRef](#)]
- Ignatov, K. When ESG talks: ESG tone of 10-K reports and its significance to stock markets. *Int. Rev. Financ. Anal.* **2023**, *89*, 102745. [[CrossRef](#)]
- Wang, Z.; Chu, E.; Hao, Y. Towards sustainable development: How does ESG performance promotes corporate green transformation. *Int. Rev. Financ. Anal.* **2024**, *91*, 102982. [[CrossRef](#)]

17. Fang, M.; Nie, H.; Shen, X. Can enterprise digitization improve ESG performance? *Econ. Model.* **2023**, *118*, 106101. [[CrossRef](#)]
18. Lin, C.; Lu, S.; Su, X.; Wen, C. Can the greening of the tax system improve enterprises' ESG performance? Evidence from China. *Econ. Change Restruct.* **2024**, *57*, 127. [[CrossRef](#)]
19. Abdullah, M.; Tiwari, A.K.; Hossain, M.R.; Abakah, E.J.A. Geopolitical risk and firm-level environmental, social and governance (ESG) performance. *J. Environ. Manag.* **2024**, *363*, 121245. [[CrossRef](#)]
20. Abakah, E.J.A.; Tiwari, A.K.; Abdullah, M.; Ji, Q.; Sulong, Z. Monetary policy uncertainty and ESG performance across energy firms. *Energy Econ.* **2024**, *136*, 107699. [[CrossRef](#)]
21. Jiang, S.; Ma, Z. How does the green credit policy affect corporate ESG performance? *Int. Rev. Econ. Financ.* **2024**, *93*, 814–826. [[CrossRef](#)]
22. Zhang, J.; Wu, W. The impact of foreign ownership on corporate ESG performance. *Financ. Res. Lett.* **2024**, *66*, 105602. [[CrossRef](#)]
23. Cohen, S.; Kadach, I.; Ormazabal, G.; Reichelstein, S. Executive Compensation Tied to ESG Performance: International Evidence. *J. Account. Res.* **2023**, *61*, 805–853. [[CrossRef](#)]
24. Chen, K.; Meng, Q.; Sun, Y.; Wan, Q. How does industrial policy experimentation influence innovation performance? A case of Made in China 2025. *Humanit. Soc. Sci. Commun.* **2024**, *11*, 40. [[CrossRef](#)]
25. Ejaz, M.R. Smart Manufacturing as a Management Strategy to Achieve Sustainable Competitiveness. *J. Knowl. Econ.* **2024**, *15*, 682–705. [[CrossRef](#)]
26. Friedman, M. The Social Responsibility of Business Is to Increase Its Profits. In *Corporate Ethics and Corporate Governance*; Zimmerli, W.C., Holzinger, M., Richter, K., Eds.; Springer: Berlin/Heidelberg, Germany, 2007; pp. 173–178.
27. Dorfleitner, G.; Utz, S.; Wimmer, M. Patience pays off—Corporate social responsibility and long-term stock returns. *J. Sustain. Financ. Invest.* **2018**, *8*, 132–157. [[CrossRef](#)]
28. Lopez-de-Silanes, F.; McCahery, J.A.; Pudschedl, P.C. Institutional Investors and ESG Preferences. *Corp. Gov. Int. Rev.* **2024**. [[CrossRef](#)]
29. Cornell, B.; Shapiro, A.C. Corporate stakeholders, corporate valuation and ESG. *Eur. Financ. Manag.* **2021**, *27*, 196–207. [[CrossRef](#)]
30. Wen, H.; Ho, K.C.; Gao, J.; Yu, L. The fundamental effects of ESG disclosure quality in boosting the growth of ESG investing. *J. Int. Financ. Mark. Inst. Money* **2022**, *81*, 101655. [[CrossRef](#)]
31. Chen, Q.; Li, M. Environmental regulatory system reform and corporate ESG ratings: Evidence from China. *Econ. Model.* **2024**, *135*, 106710. [[CrossRef](#)]
32. Chen, S.; Mao, Z.; Li, Y.; Kang, J. The effect of China's public climate concern on ESG disclosure. *Financ. Res. Lett.* **2024**, *62*, 105132. [[CrossRef](#)]
33. Li, Y.; Hua, Z. Environmental protection tax law and corporate ESG performance. *Financ. Res. Lett.* **2024**, *64*, 105423. [[CrossRef](#)]
34. Huang, L.; Lei, Z. How environmental regulation affect corporate green investment: Evidence from China. *J. Clean. Prod.* **2021**, *279*, 123560. [[CrossRef](#)]
35. Barney, J. Firm Resources and Sustained Competitive Advantage. *J. Manag.* **1991**, *17*, 99–120. [[CrossRef](#)]
36. Husnaini, W.; Tjahjadi, B. Quality Management, Green Innovation and Firm Value: Evidence from Indonesia. *Int. J. Energy Econ. Policy* **2021**, *11*, 255–262. [[CrossRef](#)]
37. Bebbington, J.; Larrinaga, C.; Moneva, J.M. Corporate social reporting and reputation risk management. *Account. Audit. Account. J.* **2008**, *21*, 337–361. [[CrossRef](#)]
38. Qian, S. The effect of ESG on enterprise value under the dual carbon goals: From the perspectives of financing constraints and green innovation. *Int. Rev. Econ. Financ.* **2024**, *93*, 318–331. [[CrossRef](#)]
39. Oh, H.J.; Lee, B.; Ma, H.H.; Jang, D.; Park, S. A preliminary study for developing perceived ESG scale to measure public perception toward organizations' ESG performance. *Public Relat. Rev.* **2024**, *50*, 102398. [[CrossRef](#)]
40. Varadarajan, R. Resource advantage theory, resource based theory, and theory of multimarket competition: Does multimarket rivalry restrain firms from leveraging resource Advantages? *J. Bus. Res.* **2023**, *160*, 113713. [[CrossRef](#)]
41. Alexeeva-Alexeev, I.; Mazas-Perez-Oleaga, C. Do ICT firms manage R&D differently? Firm-level and macroeconomic effects on corporate R&D investment: Empirical evidence from a multi-countries context. *Technol. Forecast. Soc. Chang.* **2024**, *198*, 122970. [[CrossRef](#)]
42. Lv, C.; Shao, C.; Lee, C.-C. Green technology innovation and financial development: Do environmental regulation and innovation output matter? *Energy Econ.* **2021**, *98*, 105237. [[CrossRef](#)]
43. Huergo, E.; Trenado, M.; Ubierna, A. The impact of public support on firm propensity to engage in R&D: Spanish experience. *Technol. Forecast. Soc. Chang.* **2016**, *113*, 206–219. [[CrossRef](#)]
44. Cannan, E.A.C. Pigou. The Economics of Welfare. *Econ. J.* **1921**, *31*, 206–213. [[CrossRef](#)]
45. Yi, J.; Murphree, M.; Meng, S.; Li, S. The more the merrier? Chinese government R&D subsidies, dependence, and firm innovation performance. *J. Prod. Innov. Manag.* **2021**, *38*, 289–310. [[CrossRef](#)]
46. Hu, D.; Qiu, L.; She, M.; Wang, Y. Sustaining the sustainable development: How do firms turn government green subsidies into financial performance through green innovation? *Bus. Strategy Environ.* **2021**, *30*, 2271–2292. [[CrossRef](#)]
47. Almus, M.; Czarnitzki, D. The Effects of Public R&D Subsidies on Firms' Innovation Activities. *J. Bus. Econ. Stat.* **2003**, *21*, 226–236. [[CrossRef](#)]
48. Gao, W.; Lv, G.; Li, Z. The impact of government support on firm innovation: Evidence from China. *Manag. Decis. Econ.* **2023**, *44*, 3907–3922. [[CrossRef](#)]

49. Hu, B.; Hong, G. Management equity incentives, R&D investment on corporate green innovation. *Financ. Res. Lett.* **2023**, *58*, 104533. [[CrossRef](#)]
50. Lu, H.; Cheng, Z. Digital inclusive finance and corporate ESG performance: The moderating role of executives with financial backgrounds. *Financ. Res. Lett.* **2024**, *60*, 104858. [[CrossRef](#)]
51. Jensen, M.C.; Meckling, W.H. Theory of the firm: Managerial behavior, agency costs and ownership structure. *J. Financ. Econ.* **1976**, *3*, 305–360. [[CrossRef](#)]
52. Zhu, Z.; Zhu, Z.; Xu, P.; Xue, D. Exploring the impact of government subsidy and R&D investment on financial competitiveness of China's new energy listed companies: An empirical study. *Energy Rep.* **2019**, *5*, 919–925. [[CrossRef](#)]
53. Chila, V.; Devarakonda, S. The effects of firm-specific incentives (stock options) on mobility and employee entrepreneurship. *J. Bus. Ventur.* **2024**, *39*, 106382. [[CrossRef](#)]
54. Guerrero, M.; Siegel, D.S. Schumpeter meets Teece: Proposed metrics for assessing entrepreneurial innovation and dynamic capabilities in entrepreneurial ecosystems in an emerging economy. *Res. Policy* **2024**, *53*, 104984. [[CrossRef](#)]
55. Bronzini, R.; Piselli, P. The impact of R&D subsidies on firm innovation. *Res. Policy* **2016**, *45*, 442–457. [[CrossRef](#)]
56. Si, D.-K.; Wang, Y.; Kong, D. Employee incentives and energy firms' innovation: Evidence from China. *Energy* **2020**, *212*, 118673. [[CrossRef](#)]
57. Huang, D.Z.-X. Environmental, social and governance factors and assessing firm value: Valuation, signalling and stakeholder perspectives. *Account. Financ.* **2022**, *62*, 1983–2010. [[CrossRef](#)]
58. Lu, J.; Li, H. The impact of ESG ratings on low carbon investment: Evidence from renewable energy companies. *Renew. Energy* **2024**, *223*, 119984. [[CrossRef](#)]
59. Zhao, S.; Chen, Y. ESG rating and labor income share: Firm-level evidence. *Financ. Res. Lett.* **2024**, *63*, 105361. [[CrossRef](#)]
60. Szücs, F. Do research subsidies crowd out private R&D of large firms? Evidence from European Framework Programmes. *Res. Policy* **2020**, *49*, 103923. [[CrossRef](#)]
61. Bendig, D.; Kleine-Stegemann, L.; Schulz, C.; Eckardt, D. The effect of green startup investments on incumbents' green innovation output. *J. Clean. Prod.* **2022**, *376*, 134316. [[CrossRef](#)]
62. Leite, R.; Mendes, L.; Camelo, E. Innovating microcredit: How fintechs change the field. *J. Econ. Bus.* **2024**, *128*, 106158. [[CrossRef](#)]
63. Cho, J.; Kim, H. Does a consistently capitalized R&D ratio improve information effects of capitalized development expenditures? *Int. Rev. Financ. Anal.* **2024**, *93*, 103214. [[CrossRef](#)]

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.