sustainability

MDPI

Article

Corporate Governance, Media Coverage, and Corporate Environmental Protection Investment: Empirical Evidence from Listed Companies in China's High-Pollution Industries

Yuan Wang [1,2] and Junrui Zhang [1,3,*]

[1] School of Management, Xi'an Jiaotong University, Xi'an 710049, China; wangyuan19@stu.xjtu.edu.cn
[2] School of Management, Xi'an University of Science &Technology, Xi'an 710054, China
[3] Department of Management, Xi'an Jiaotong University City College, Xi'an 710018, China
* Correspondence: zhangjr@xjtu.edu.cn; Tel.: +86-139-9191-2990

Abstract: In this study, regarding listed companies of high-pollution industries in China's A share as the research object and media coverage as the moderator variable, corporate governance data from 2015 to 2019 were selected. Studied the impact of corporate governance and media coverage on corporate environmental protection investment. Corporate governance was divided into four dimensions: shareholding structure, characteristics of the independent directors, characteristics of the board of supervisors, and management characteristics. A multiple regression model and monitoring model were constructed to study the influencing factors of the environmental protection investment behavior of enterprises, and the relationship between relevant variables was empirically tested. The results show the following: (1) The equity structure is expressed by the degree of separation of cash flow rights and shareholders' control rights. There is a significant negative correlation between shareholding structure and enterprise environmental protection investment. The characteristics of the board of supervisors and management are measured by executive compensation. The characteristics of the board of supervisors have a significant positive impact on an enterprise's environmental protection investment. Management characteristics have a significant positive impact on enterprise environmental protection investment. (2) Media coverage as a moderator variable is measured by the data reported by important Chinese newspapers. In the robustness test, media coverage is measured by the number of Chinese financial newspaper reports and the number of online media reports. Media coverage positively regulates the relationships among the ownership structure, the characteristics of the board of supervisors, management characteristics, and enterprise environmental protection investment. (3) Positive media reports have a more significant moderating effect than negative media reports.

Keywords: corporate governance; media coverage; environmental protection investment; high-pollution industry

Citation: Wang, Y.; Zhang, J. Corporate Governance, Media Coverage, and Corporate Environmental Protection Investment: Empirical Evidence from Listed Companies in China's High-Pollution Industries. *Sustainability* **2023**, *15*, 8643. https://doi.org/10.3390/su15118643

Academic Editor: Pierfrancesco De Paola

Received: 13 April 2023
Revised: 22 May 2023
Accepted: 24 May 2023
Published: 26 May 2023

1. Introduction

In May 2018, President Xi Jinping stressed at the National Conference on ecological environment protection that "green development is an inevitable requirement for building a high-quality modern economic system and a fundamental policy for solving pollution problems." During the construction of China's ecological civilization, the investment in environmental pollution control in various regions and industries has increased annually. Enterprises are also aware of the importance of the environment, so they are continuing to strengthen environmental protection measures in production and operation to contribute to the realization of a "Beautiful China." Nowadays, the environmental protection carried out by high-pollution industries has become the focus of both the government and enterprises.

Profit-making enterprises usually lack enthusiasm and initiative in environmental protection because of the large required investment with few economic benefits [1]. If an

enterprise blindly reduces the expenditure on environmental protection, it may violate the laws and regulations of environmental protection. However, increasing the investment in environmental protection may affect the profits of enterprises, resulting in greater environmental and social benefits than economic benefits [2]. Such a scenario may cause an inability to effectively control the environmental governance of enterprises. Therefore, we need to first guide and encourage investments in enterprise environmental protection with the help of exogenous forces, such as government environmental regulation policies [3]. Most of the existing environmental studies focus on exogenous factors, including environmental regulation and marketization processes [4–11]. However, enterprises should consider internal governance models after external factors have taken effect.

Regarding corporate governance, existing studies mainly focus on the impact of corporate governance on environmental information disclosure, such as the nature of property rights, independent directors [12,13], enterprise scale, enterprise profitability [14], and board size [15], but the impact of corporate governance on environmental protection investment is rarely mentioned. In environmental governance, enterprises must constantly invest funds (for example purchasing environmental protection and energy-saving equipment and developing advanced clean technology [16]), which ultimately depends on the company's business orientation and decision-making process. Corporate governance is an institutional arrangement to define the relationship between the main stakeholders in the enterprise, which can effectively address the concerns of all parties caused by any agency problem, allowing enterprise decisions to be made scientifically. Therefore, the behavior of enterprise environmental protection investment results from game negotiations among stakeholders from across the whole corporate governance [17]. In addition, in the context of global commitment to carbon emission reduction, environmental governance in highly polluting industries can reduce environmental pollution as much as possible [18], which is also a useful way to achieve China's carbon peak and carbon neutrality targets [19]. Hence, this paper focuses on the impact of corporate governance on environmental protection investment decisions of highly-polluting enterprises.

On the other hand, under the influence of external factors, the media coverage of enterprise environmental pollution and governance has also increased significantly [20]. Carroll and McCombs [21] pointed out that the number and attitude of media reports on enterprises are positively related to the public's interest in and evaluation of enterprises. The media is vital to the public understanding and evaluation of an enterprise. At the same time, stakeholders obtain enterprise information mainly through the news [22,23]. Therefore, the media is a key to information dissemination, providing information for enterprise investors and creditors. Simultaneously, the media aids the governance and supervision of assignments. Events exposed by the media have aroused the attention of enterprise stakeholders to varying degrees. At the same time, media supervision puts pressure on enterprises' environmental protection behavior [24]. Therefore, considering the role of media coverage and corporate governance, it is pertinent to explore the regulatory role of corporate environmental governance.

This paper's main contributions cover three aspects: (1) Research on corporate governance and environmental protection, focusing on corporate governance, environmental regulation, and information disclosure. This paper divides corporate governance into four aspects—shareholding structure, characteristics of the independent directors, characteristics of the board of supervisors, and characteristics of the management—and analyzes the impact of corporate governance on the environmental protection investment of enterprises. The results further provide certain suggestions for the decision-making processes of enterprises in four aspects. (2) The existing research on media coverage mainly focuses on corporate quality and social responsibility, and few scholars have studied the impact of media coverage on environmental protection investment. From the media coverage aspect, this study analyzes the effect of regulation on the relationship between corporate governance and environmental protection investment, providing feasible suggestions to improve the effectiveness of media supervision and environmental governance. (3) In the

past, the measurement of media supervision has mainly focused on the total number of reports. However, the media's attention produces positive governance effects [20] amidst adverse (pressure) effects [25]. By collecting the total number of environmental reports, including both paper media coverage and online media coverage, this study distinguishes the number of positive and negative reports on the environment. The role of media supervision and governance is investigated in detail, while the research findings of enterprise environmental protection investment at different levels are enriched.

2. Literature Review and Hypotheses Development

2.1. Corporate Governance and Environmental Protection Investment

From the management perspective, corporate governance originates from the separation of ownership and management. Its essence is to solve the agency problem caused by the separation of ownership and control [26]. The purpose of corporate governance is to reduce agency costs and maximize enterprise value. Therefore, corporate governance is the core issue of the modern enterprise system. However, with the continuous deterioration of the ecological environment, enterprises should bear social responsibility and invest more in environmental protection to perform the duties of agents and obtain agency costs.

On the other hand, the agent must also control the enterprise's operating costs to ensure economic benefits. Therefore, how to carry out environmental protection and control the amount of environmental protection investment, curb environmental problems, and maximize the enterprise's value are some of the goals of corporate governance. Research has shown that corporate governance affects the environmental protection investment of enterprises. For example, Yang et al. [27] explained the influence factors of enterprise environmental protection investment from three aspects of corporate governance: shareholding structure, characteristics of the board of directors, and characteristics of senior executives. Jiang and Xu [28] showed that the size of the board of directors, the proportion of independent directors, and the environmental protection investment of enterprises have a positive correlation, and the shareholding ratio of the largest shareholder and the management had a negative correlation with the environmental protection investment of enterprises. Ren [17] concluded that the environmental protection investment behavior of enterprises is the result of negotiation among the stakeholders involved in corporate governance, in which the internal governance mechanisms (such as the company's ownership structure, the nature of property rights, the characteristics of the board of directors, and the characteristics of senior executives) directly impact the environmental protection investment behavior of enterprises. Some scholars also discussed the impact of environmental protection investment on enterprises from certain perspectives related to corporate governance, such as the academic experience of senior executives [29] and managers' self-confidence [30] etc.

2.1.1. Shareholding Structure and Environmental Protection Investment

As the basis of the corporate governance structure, shareholding structure determines the difference between enterprise investment ability and investment willingness and ultimately determines an enterprise's decision-making behavior and performance. Different corporate governance structures would also affect enterprises' environmental investment level and behavior [31]. During economic transformation, the actual control of most listed companies in China is usually held by one or a few major shareholders [32]. Additionally, the major shareholders often pursue economic interests. According to the agency theory, the controlling shareholders would take advantage of their dominant position to obtain the private interests of control at the expense of the interests of minority shareholders [33]. Therefore, the controlling shareholders would use their control of the company to maximize their income rather than the company's overall value. The controlling shareholders tend to have short-term interests, making decisions to avoid risks and abandon environmental protection investment decisions with long-term benefits.

At the same time, according to the principal-agent theory, the first kind of agency problem based on a decentralized ownership structure has been transformed into a second

kind with the separation of control rights and cash flow rights. The contradiction of this kind of agency problem depends on the degree of separation of the two rights. When the second kind of agency problem arises, the controlling shareholders can use the smaller cash flow appropriately to obtain more significant control rights and manipulate the company's business decisions [34]. Li and Ji [35] believed that the greater the degree of separation between control rights and cash flow rights, the lower the own costs paid by controlling shareholders to encroach on the same benefits. They are willing to make radical decisions to achieve high returns from high risks, resulting in difficulties in sustainable growth and declining performance. The greater the separation, the more prominent the contradiction of the agency problem, the higher the agency cost that the company needs to pay, and the lower the enterprise value, indicating the disadvantages of corporate governance. Claessen et al. [36] also proposed that when the separation of control rights and cash flow rights led to controlling shareholders using smaller cash flow rights to control the company's operations, hollowing out the company, reducing the company's value, and impeding corporate environmental governance. Lins [37] also confirmed that there is a negative correlation between company value and the separation of control rights and cash flow rights. Xue and Liu [38] considered the greater the degree of separation between control rights and cash flow rights, the lower the willingness of major shareholders to bear the risks and the more reluctant they are to invest in technological innovation and other projects. Additionally, more "collusions" between major shareholders and the management in terms of non-economic project investment occur [39].

Based on this analysis, companies aim to make profits, and they tend to invest their funds in economic projects rather than environmental projects. When the greater the separation between the control rights and cash flow rights of a company, it will lead to a decrease in the value of the company. In order to ensure the interests of shareholders, the actual controlling shareholders take an indifferent attitude towards corporate environmental protection. So, this paper proposes hypothesis 1 (H1) when other conditions are certain:

H1. *Under the same conditions, the degree of separation between control rights and cash flow rights is negatively related to corporate environmental protection investment.*

2.1.2. Independent Directors' Characteristics and Environmental Protection Investment

In a corporate governance system, as the representatives elected by shareholders, the board of directors supervises and motivates the management on behalf of shareholders. The board also approves major decisions related to the enterprises [40]. The purpose of the board of directors is to reduce the information asymmetry between shareholders and managers (i.e., the principal agents) to realize the scientificity of the company's decision-making process and safeguard the interests of all parties [17]. According to the requirements of the China Securities Regulatory Commission, independent directors must be established among the members of the board of directors. Independent directors are mostly experts outside the enterprise with no interest in or relationship with the company. They represent more of the interests of the majority of small and medium-sized shareholders. Their independence can reduce the degree of enterprise information asymmetry, effectively alleviate agency conflict, and allow a more objective evaluation of the decision-making behavior of the enterprise, thereby affecting the scale of environmental protection investment of the enterprise [41]. Previous research has shown that independent directors affect environmental investment by encouraging and constraining directors and supervising and balancing the board of directors. Forker [42] pointed out that independent directors can supervise the environmental decision-making process of the company's managers. The larger the proportion, the more effective the role of monitoring in supervising the enterprise to make more effective, environmentally driven decisions. Beasley [43] believed that the higher the proportion of independent directors, the greater their independence, supervision, and influence on enterprise decision-making. Therefore, the more effective they are, the better able they are to prevent major shareholders and management from making decisions

inconducive to the enterprise development. Thus, they are crucial in further improving the decision-making process and implementation of environmental governance. Xie and Wang [44] have studied that the higher the proportion of independent directors, the richer and more detailed the information related to environmental investment issues proposed by independent directors will be prepared, and the greater the likelihood of discussion and adoption at the board meeting, thereby ensuring that the final implementation of environmental investment strategies has higher authority and stronger guidance.

Based on this analysis, independent directors can supervise the performance of corporate environmental responsibilities. The higher the proportion of independent directors, the stronger the effectiveness of curbing moral hazard and opportunistic behavior among managers, and play a catalytic role in investment in corporate environmental governance. So, this paper puts forward hypothesis 2 (H2) when other conditions are certain:

H2. *Under the same conditions, the proportion of independent directors is positively related to corporate environmental protection investment.*

2.1.3. Characteristics of the Board of Supervisors and Environmental Protection Investment

As the internal supervision organization of the joint-stock company, the board of supervisors functions primarily to prevent the board of directors and the management from abusing their powers and damaging the interests of shareholders and the company. The existing literature has rarely examined the impact of the characteristics of the board of supervisors on environmental protection investment. The related research mainly focuses on two aspects: (1) There is a significantly positive correlation between the size of the board of supervisors and environmental information disclosure [14,15,45]. (2) There is a significantly positive correlation between the supervisory activity of the board of supervisors [46], the quality of the board of supervisors [47], and the shareholding ratio of the board of supervisors [48] and corporate performance.

The precondition for members of the supervisory board to perform their duties is whether they can receive the corresponding remuneration. Although under normal circumstances, the members of the board of supervisors are not remunerated, the members of the board of supervisors are generally composed of directors or employees of the company who are originally remunerated. Therefore, the company does not need to pay any additional remuneration. However, too little or no compensation for members of the supervisory board can result in the separation of responsibility and power, which not only fails to stimulate the subjective initiative of supervisors but also makes them become vassals of the management and lose their supervisory function. The independence of the board of supervisors is its most basic prerequisite, and only by ensuring the independence of the economic interests of supervisors can the independence of the functions of the board of supervisors be guaranteed so that it will not lose its supervisory function due to the attachment of interests to the "supervised." Therefore, some company bylaws or shareholders' meetings have agreements on the additional payment of remuneration to the board of supervisors, which is also intended to provide certain incentives and assessments for personnel concurrently serving as supervisors, thereby more effectively promoting the performance of supervisory duties by members of the board of supervisors. Ren et al. [49] concluded that the remuneration of the board of supervisors prompts members to become stakeholders of the enterprise, thus causing the development of the enterprise to directly affect their economic income. Therefore, attractive remuneration makes members of the board of supervisors more inclined towards the long-term interests of the enterprise, thereby paying more attention to investment in environmental governance.

Based on this analysis, if the company pays certain salaries and provides certain financial incentives to the members of the supervisory board, it will further urge the members of the supervisory board to urge the management of the enterprise to fulfill their environmental protection responsibilities and actively promote the environmental

protection investment of the enterprise. So, this paper puts forward hypothesis 3 (H3) when other conditions are certain:

H3. *Under the same conditions, compensation incentives of members of the supervisory board are positively related to corporate environmental protection investment.*

2.1.4. Management Characteristics and Environmental Protection Investment

In enterprise operations, the company has been punished for causing pollution due to environmental damage, and more and more stakeholders are demanding that the company bear environmental responsibility. In order to encourage executives to actively engage in environmental governance, companies will use compensation incentives to achieve environmental goals and maximize profits. The assessment of executive compensation is based on the previous performance level of executives, which will affect their behavioral decisions regarding the environment in the next stage. So, executive compensation will affect the company's environmental governance [50]. Based on agency theory, because information asymmetry induces adverse selection and moral hazards, the management will maximize their benefits. If management can obtain an improved salary, it shows recognition and support for their work to an appreciable extent. On the other hand, the expenditure of a high salary depends on the operating efficiency of the enterprise. Therefore, while benefiting from the high income, they will also bear the economic consequences of their decisions in managing the enterprise. As rational economic actors, executives weigh their reward with their own cost and effort before choosing to act to maximize their interests. Therefore, higher remuneration often encourages managers to make more efforts to improve corporate performance. Such an improvement increases their income, thus forming a virtuous circle [51]. In addition, the labor supply theory holds that managers will weigh the benefits between leisure and labor supply to maximize their effects. When salary is increased, managers will give up "leisure" and choose "labor supply" to obtain a higher salary, thereby improving the business performance of the enterprise [52]. Pascual and Ruis [53] concluded that long-term compensation for senior executives is conducive to the implementation of the enterprise's pollution prevention strategy. Gerhart and Milkovich [54] believed that variable compensation is positively related to enterprise performance, and equity compensation has a significant impact. Wu and Wu [55] concluded that the higher the sensitivity of management compensation performance, the lower the tendency towards and degree of self-interest. Therefore, management compensation will affect the decision-making behavior of the management. Zou et al. [56] found that companies reduce pollutant emissions and improve environmental performance levels through executive compensation incentives. Wang et al. [57] showed that senior managers, especially in highly polluting industries, have a greater management ability to optimize available resources, affecting the company's sustainable development.

Based on this analysis, a reasonable salary incentive mechanism is essential in enterprise management. The level of salary directly affects the work enthusiasm of managers and is also an important aspect of corporate environmental governance, becoming a self-promoting factor for the development of enterprises. So, this paper puts forward hypothesis 4 (H4) when other conditions are certain:

H4. *Under the same conditions, compensation incentives of members of management are positively related to corporate environmental protection investment.*

2.2. Media Coverage and Environmental Protection Investment

Because big data is an external component of the supervision mechanism of the company, the media plays a critical intermediary role in information disclosure, collection, and dissemination, having become an indispensable part of corporate governance [58]. Therefore, media coverage greatly impacts the business activities of enterprises. On the one hand, media reports increase companies' exposure, and the relevant stakeholders

can better understand the enterprise [59]. Dyck et al. [22] concluded that media reports could encourage illegal enterprises to cease their misconduct as soon as possible and protect the interests of minority shareholders. On the other hand, media coverage has some supervisory effects on the company, especially bringing external pressure to the company. The report content from the media has a reputational impact on the enterprise and management. It even attracts more attention from governmental departments [60], leads to higher corporate social responsibility, and promotes the enterprise's legitimate operation.

Many scholars have recognized the supervisory role of the media on corporate governance [22,61,62]. At the same time, some scholars have shown that when the media make negative reports on an enterprise, the enterprise faces severe and numerous public accusations and strong legitimacy pressures. As a result, it will take measures (such as shutting down) to increase the internal environmental protection investment to deal with media queries, hoping to convey a positive image to the public [63]. Therefore, the supervisory role of the media makes enterprises pay more attention to legal operations and maintain their reputation. To promote their long-term development, enterprises would make reasonable environmental protection investments and engage in legal and compliant production.

Therefore, media attention increases the transparency between enterprises and relevant stakeholders. The media further reduces the cost of obtaining information for the public and government departments and motivates enterprises. For its reputation and development, the enterprise needs to actively fulfill its social responsibility and undertakes the responsibility of environmental governance. On the contrary, enterprises are easily pressured by public opinion due to the high-intensity attention of the media. They may engage in some short-sighted behaviors to avoid adverse effects [64], such as "public relations" or "bleaching" behavior. When the pressure of public opinion is resolved, enterprises focus on self-improvement, actively take environmental governance investment measures, and show compliance behavior.

Therefore, when other conditions are certain, this paper puts forward the following assumptions:

H5a. *Media coverage moderates the relationship between the degree of separation between control rights and cash flow rights and the environmental protection investment of enterprises. The higher the media coverage, the stronger the blocking effect of the degree of separation between control rights and cash flow rights on the environmental protection investment of enterprises.*

H5b. *Media coverage moderates the relationship between the proportion of independent directors and the environmental protection investment of enterprises. The higher the media coverage, the stronger the promoting effect of the proportion of independent directors on the environmental protection investment of enterprises.*

H5c. *Media coverage moderates the relationship between compensation incentives of members of the supervisory and environmental protection investment of enterprises. The higher the media coverage, the stronger the promoting effect of compensation incentives of members of the supervisory on the environmental protection investment of enterprises.*

H5d. *Media coverage moderates the relationship between compensation incentives of members of management and the environmental protection investment of enterprises. The higher the media coverage, the stronger the promoting effect of compensation incentives of members of management on the environmental protection investment of enterprises.*

3. Research Methodology

3.1. Sample Selection and Data Sources

China implemented a new environmental protection law in 2015. This law fights against the pollution that attracts great public resentment. Therefore, this paper selects the data gathered after implementing the law primarily on A-share listed companies in heavily polluting industries from 2015 to 2019. The heavily polluting enterprises were

selected based on the industry classification guidelines of listed companies revised by the China Securities Regulatory Commission in 2012. The classified management directory of listed companies' environmental protection verification was formulated by the Ministry of Environmental Protection in 2008, and the guidelines for the environmental information disclosure of listed companies. The list includes 16 industries, such as those of thermal power, steel, cement, electrolytic aluminum, coal, metallurgy, chemical industry, petrochemical, building materials, papermaking, brewing, pharmacy, fermentation, textile, tanning, and mining.

At the same time, in this paper, the following data screening is carried out: (1) companies that eliminate ST (special treatment) and *ST are included; (2) companies with incomplete data during the observation period are excluded; and (3) companies delisted or listed during the observation period are excluded. Finally, 2580 observations are selected.

The data used in this research are mainly derived as follows: (1) all of the data about corporate governance were from the CSMAR (China Stock Market & Accounting Research Database) database and the annual reports of listed companies. The missing data in the database were collected manually by the author through the annual reports of listed companies and calculated according to the definition of variables. (2) The data on environmental protection investment were obtained from the annual reports of listed companies, enterprise environmental reports, and sustainable development reports, which were collated and sorted manually. (3) The media coverage data were sourced from the full-text database of prominent newspapers in China and were collated and sorted manually. (4) The control variable data were from CSMAR and WIND databases. Finally, all continuous variables were winsorized on the upper and lower 1% quantiles. SPSS25.0, Eviews12.0, Stata16.0, and Excel 2010 software were used in the statistical analysis.

3.2. Definition of Variables

3.2.1. Dependent Variables

This paper takes environmental protection investment (EPI) as the dependent variable. Under China's current accounting system, enterprises have not reached a consensus on a special definition and measurement method of environmental protection investment.

At present, there are three representative views: (1) to study the aspect of environmental protection equipment and take the project data (such as pollution control equipment, purchase, and the transformation of production lines related to environmental protection) as the total amount of environmental protection investment [65–67]; (2) to focus on environmental protection technology, which defines environmental protection investment as an investment in developing cleaner production technology, developing environmentally friendly products, improving pollution control capacity, and increasing operating expenses to meet environmental standards [68,69]; (3) to use environmental protection investment [70–72] and environmental performance [73] as alternative variables of environmental protection investment.

Because environmental protection investment is a special investment, it is not easy to bring economic benefits to enterprises in the short term, they the investment benefits of environmental protection equipment or the application of environmental protection technology. At the same time, environmental protection investment also includes social responsibility and benefits.

Based on Tang and Li [74], this paper comprehensively presents environmental protection investment from the perspectives of investment and governance. (1) Investment. The investment here is divided into fixed asset investment and intangible asset investment. Fixed asset investment mainly refers to the investment and transformation of various environmental protection equipment under construction or fixed assets. Intangible asset investment mainly refers to investing in various environmental protection products and technologies that are considered R&D expenditures. (2) Governance. This part includes pollution control, environmental taxes, and ecological expenses. The content of this definition is comprehensive, and there is no duplication. Governance primarily shows that

the enterprise governs the unreasonable behavior in the current environment and reflects social responsibility and short-term benefits. The investment is mainly geared towards the long-term business objectives of the enterprise, reflecting the long-term social and environmental benefits. At the same time, this idea is also in line with the business laws of an enterprise. When an enterprise does not meet the environmental protection requirements, it should mitigate environmental pollution first before considering all kinds of investment in environmental protection. In this paper, the variables are collated manually, and the sum of investment and governance is taken. The natural logarithm was taken for the data to avoid the influence of enterprise scale and extreme values.

3.2.2. Independent Variables

The independent variables of this article are equity structure, independent director characteristics, supervisory board characteristics, and management characteristics. This paper takes the separation degree of control rights and cash flow rights as the alternative variable of ownership structure and takes the proportion of independent directors as an alternative variable of independent director characteristics. At the same time, to eliminate the influence of enterprise scale, the proportion of the remuneration of the board of supervisors to the total assets of the enterprise at the end of the period is taken as the alternative variable of supervisory board characteristics, the ratio of executive compensation to total assets at the end of the period is taken as the alternative variable of management board characteristics.

3.2.3. Moderating Variable

As a third-party supervision subject independent of the government and enterprises, the media plays a critical role in today's society. The greater the amount of media coverage on a topic, the more likely it is to be regarded as an important issue. Similarly, when the amount of environmental information reported by the media on an enterprise increases, people pay more attention to the enterprise, attracting the attention of relevant stakeholders of the enterprise. Therefore, this paper takes the total amount of news reported (MEDIA) on the company's environment as an alternative variable of media coverage. In addition, this study distinguishes between positive reports and negative reports. Specifically, in the full-text database of China's popular newspapers, we first gathered news about listed companies with the themes "environment" and "environmental protection". Secondly, the collated results were manually screened, and irrelevant reports (such as "business environment" and "financing environment") were deleted. Finally, the screened results were read manually to distinguish between positive reports (MEDIAp) and negative reports (MEDIAn). Positive statements in the news, such as energy conservation, the purchase of environmental protection equipment, emission reduction, consumption reduction, investment, and R&D, were defined as positive reports. Negative statements, such as pollution, sewage discharge, illegal discharge, exceeding the standard, leakage, and being unqualified in a report, were regarded as negative.

3.2.4. Control Variables

According to the existing research literature, the control variables selected in this paper are as follows: (1) Company size (SIZE): The company's size determines the company's material basis, the strength of environmental protection investment, and the ability to resist risks. This paper selects the asset size as the alternative variable of the company size. (2) Debt level (DEBT): The debt status of the enterprise reflects the financing and, to a certain degree, the investment ability of the enterprise. To a certain extent, the more significant the debt, the greater the financial impact on the enterprise, and the more likely it is that the enterprise will fall into financial deterioration. Without abundant capital to invest in environmental protection, an enterprise can only develop short-term interests. This paper selects the asset-liability ratio as an alternative variable of the degree of debt.

In summary, the main variable definitions in this paper are listed in Table 1.

Table 1. Definition of variables in the current study.

Variable	Acronyms	Variable Description
EPI	E	LN (total annual environmental protection investment)
SQ	S	Proportion of control rights/proportion of cash flow rights
DB	D	Number of independent directors/total number of directors
RBS	R	(Basic annual salary + performance annual salary)/total assets × 100%
MC	M	(Salary + bonus + long-term incentive compensation)/total assets × 100%
MEDIA	Me	Total number of paper media reports
SIZE	Si	LN (total assets)
DEBT	De	(Total liabilities/total assets) × 100%

3.3. Model Construction

According to assumptions H1–H4, we established fixed-effect multiple regression models (1)–(4) to test the impact of shareholding structure, independent directors characteristics, characteristics of the board of supervisors, and characteristics of the management on environmental protection investment. Furthermore, EPI is the enterprise environmental protection investment variable, SQ is the ownership structure variable, DB is the independent directors' characteristics, RBS is the board of supervisors characteristic variable, MC is the management characteristic variable, SIZE is the company characteristic variable, DEBT is the enterprise debt degree variable, and Year is the fixed annual effect. In model (1), α_1 is expected to be significantly negative, while α_2 is expected to be significantly positive in models (2)–(4).

$$EPI = \alpha_0 + \alpha_1 SQ + \alpha_2 SIZE + \alpha_3 DEBT + \alpha_4 Year + \varepsilon \quad (1)$$

$$EPI = \alpha_0 + \alpha_1 DB + \alpha_2 SIZE + \alpha_3 DEBT + \alpha_4 Year + \varepsilon \quad (2)$$

$$EPI = \alpha_0 + \alpha_1 RBS + \alpha_2 SIZE + \alpha_3 DEBT + \alpha_4 Year + \varepsilon \quad (3)$$

$$EPI = \alpha_0 + \alpha_1 MC + \alpha_2 SIZE + \alpha_3 DEBT + \alpha_4 Year + \varepsilon \quad (4)$$

For H5, we built model (5):

$$EPI = \beta_0 + \beta_1 CorpGov + \beta_2 MEDIA + \beta_3 CorpGov * MEDIA + \beta_4 SIZE + \beta_5 DEBT + \beta_6 Year + \varepsilon \quad (5)$$

where CorpGov represents the respective independent variables, i.e., SQ (equity structure variable), DB (independent directors characteristics variable), RBS (board of supervisors characteristic variable), and MC (management characteristic variable), MEDIA is the media coverage variable, CorpGov $*$ MEDIA is the multiplication term of each independent variable and the media coverage variable, Year is the fixed annual effect, and β_3 is expected to be significantly positive.

4. Empirical Results and Analysis

4.1. Correlation Analysis

This paper adopted the Pearson coefficient to measure the correlation between the test variables (Table 2).

Table 2. Correlation between test variables.

	EPI	SQ	DB	RBS	MC	MEDIA	SIZE	DEBT
EPI	1							
SQ	−0.670 **	1						
DB	0.340 **	−0.112	1					
RBS	−0.440 **	0.215 *	−0.209 *	1				
MC	−0.562 **	0.129	−0.315 **	0.708 **	1			
MEDIA	0.439 **	−0.199	0.334 **	0.140	−0.121	1		
SIZE	0.865 **	−0.523 **	0.396 **	−0.691 **	−0.780 **	0.314 **	1	
DEBT	−0.042	−0.193	−0.184	−0.226 *	−0.233 *	−0.495 **	0.146	1

This table reports the Pearson correlation between the regression variables. The superscript asterisks ** and * denote two-tailed statistical significance at the 1% and 5% levels, respectively.

The Pearson correlation analysis showed that the ownership structure is negatively correlated with environmental protection investment, significant at the 1% level, indicating that the greater the separation of the two rights, the lower the amount of environmental protection investment. The characteristics of independent directors and media attention positively correlated with environmental protection investment, significant at the level of 1%. In addition, the characteristics of the board of supervisors were significantly but negatively correlated with the environmental protection investment at the level of 1%, whereas the management characteristics were significantly and negatively correlated with environmental protection investment at the level of 5%. Hypotheses 1 and 2 (H1 and H2) are preliminarily verified.

In the control variables, a significant positive correlation exists between company characteristics and environmental protection investment at the level of 1%, indicating that the amount of environmental protection investment is indeed affected by the company size. Large companies pay more attention to enterprise environmental protection, have relatively strong financial strength, and have profound environmental governance and investment. In addition, some independent variables also show significant correlations. The maximum correlation coefficient between independent variables is 0.708. According to the judgment standard of multicollinearity, if the correlation coefficient is <0.7, it indicates that there is no serious multicollinearity problem between the variables. Furthermore, the variance expansion factor (VIF), calculated using SPSS, suggests that if the tolerance is >0.1 and the VIF < 10, it indicates no severe multicollinearity problem between the variables. Therefore, the selection of variables is appropriate, and multivariable regression analysis can be carried out.

4.2. Regression Analysis

Table 3 shows the stability test of the sample data. From these results, we can see that the sample data passed the three tests of LLC, ADF-Fisher, and PP-Fisher (Prob is less than 0.05), indicating that the sample data are stable.

Table 3. Unit Root test.

Method	Statistic	Prob. **
Levin, Lin & Chu t*	−49.3892	0.0000
ADF-Fisher Chi-square	454.575	0.0000
PP-Fisher Chi-square	519.191	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Table 4 lists the cointegration test (Kao test) of sample data, from which it can be seen that Prob is less than 0.05, indicating that the data are cointegrated. Therefore, the sample data can be used for regression analysis.

Table 4. Cointegration test.

ADF	t-Statistic	Prob.
	−7.563391	**0.0000**
Residual variance	0.202250	
HAC variance	0.168018	

Table 5 lists the hypothetical regression results for this study. The adjusted R-squares of the four models are 0.833, 0.780, 0.805, and 0.797, respectively. The F values are significant, indicating that the models fit well as a whole.

Table 5. Variables of the regression analysis.

Variable	Model (1) EPI	Model (2) EPI	Model (3) EPI	Model (4) EPI
SQ	−0.293 *** (−5.375)			
DB		−0.070 (−1.235)		
RBS			0.271 *** (3.520)	
MC				0.228 *** (2.911)
MEDIA	0.179 *** (3.159)	0.132 ** (2.058)	−0.006 (−0.082)	0.102 (1.640)
SIZE	0.654 *** (10.888)	0.868 *** (14.418)	1.075 *** (12.668)	1.024 *** (12.363)
DEBT	−0.008 (−0.134)	−0.116 * (−1.867)	−0.141 ** (−2.394)	−0.088 * (−1.489)
F	112.141 ***	80.089 ***	92.814 ***	88.226 ***
Adj R^2	0.833	0.780	0.805	0.797
Year	Controlled	Controlled	Controlled	Controlled
N	2580	2580	2580	2580

The superscript asterisks ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

From the regression results of model (1), it can be seen that the ownership structure is negatively correlated with the environmental protection investment. It is significant at the 1% confidence limit, indicating that the lower the degree of separation of two rights, the more influential the environmental protection investment is on the positive change. Model (2) shows that the independent directors characteristics correlated negatively with the environmental protection investment, indicating that the proportion of independent directors negatively impacts the enterprise's environmental protection investment. In addition, Models (3) and (4) show that the characteristics of the board of supervisors, management, and environmental protection investment are significantly and positively correlated at the 1%significant level, indicating that the higher the remuneration of the board of supervisors and the financial motivation of senior executives, the greater the environmental protection investment of enterprises.

Among the four independent variables, H1, H3, and H4 are verified, showing that in the corporate governance of high-pollution industries, the ultimate controller has great decision-making power in terms of environmental protection investment. Such a body reckons with the importance of environmental protection and allocates the necessary funds to support it. The board of supervisors can also promote the function of supervision and restraint, positively promoting the expenditure of the enterprise on environmental protection

investment. Therefore, the higher the financial motivation of the management, the greater the work enthusiasm, making reasonable decisions conducive to the long-term development of the enterprise and strengthening the investment in environmental protection.

The board of directors' characteristics were negatively correlated with the enterprise's environmental protection investment; thus, H2 is not tenable. This occurrence is due to the fact that independent directors in the board of directors should ensure adequate attention is designated to environmental protection. However, there is a common situation whereby independent directors do otherwise, especially in crucial cases and events. At the same time, according to China's relevant laws and regulations, the company's independent directors have no annual salary, but the company should give corresponding subsidies. Therefore, to a certain extent, independent directors are paid by listed companies and invited by major shareholders, leading to the obstruction of independent directors' independence and existence.

Secondly, the control variables pass the significance test at the 1% level, showing that the company characteristics have a significant positive correlation with environmental protection investment, i.e., the larger the scale of the enterprise, the higher the environmental protection investment. At the same time, except for model (1), the debt degree passes the significance test in the other three models, indicating that the debt degree has a significant negative correlation with environmental protection investment. Here, the higher the asset-liability ratio of the enterprise, the smaller the environmental protection investment. Thus, the enterprise may have poor management, difficult capital operation, and no more capital to invest in environmental protection under the condition of high debt.

In addition, this paper introduces independent variables and control variables into the model through stepwise regression. The results are shown in Table 6, which shows that the shareholding structure, the characteristics of the board of supervisors, and media attention have the greatest impact on the environmental protection investment of enterprises.

Table 6. Stepwise regression analysis.

	Unstandardized Coefficient		**Standardized Coefficient**		
Model	**B**	**Std Error**	**Beta**	**t**	**Prob.**
constant	−6.401	1.923		3.329	0.001
SIZE	0.718	0.074	0.791	9.643	0.000
SQ	−0.027	0.005	−0.264	−5.144	0.000
MEDIA	0.001	0.000	0.118	2.250	0.027
RBS	4990.799	2402.829	0.147	2.077	0.041
F	118.882 ***				
Adj-R^2	0.841				

The superscript asterisks *** denote statistical significance at the 1% levels.

4.3. Moderating Effect Analysis

Table 7 lists the regression results of the moderating effect.

From the results of model (5a), we infer that the multiplier coefficient of ownership structure and media attention is −0.250, which is significant at the level of 1%. Because the independent variable ownership structure correlated negatively and significantly with the enterprise environmental protection investment, the cross multiplication coefficient of ownership structure and media attention is also significantly negative. This observation means that the symbols of the two coefficients are consistent, showing that the moderating effect is enhanced. In other words, it shows that the stronger the media coverage, the stronger the negative correlation between the ownership structure and the enterprise's environmental protection investment. The moderating effect quantity is $0.847 - 0.833 = 0.014$. Therefore, H5a is true.

Table 7. Regression analysis results of the moderating effect.

Variable	Model (5a) EPI	Model (5b) EPI	Model (5c) EPI	Model (5d) EPI
SQ	−0.269 *** (−5.090)			
MEDIA	0.430 *** (4.290)			
SQ×MEDIA	−0.250 *** (−2.977)			
DB		−0.083 (−1.414)		
MEDIA		−0.013 (−0.069)		
DB×MEDIA		0.166 (0.835)		
RBS			0.339 *** (4.422)	
MEDIA			0.259 ** (2.370)	
RBS×MEDIA			0.292 *** (3.078)	
MC				0.248 *** (3.177)
MEDIA				0.299 ** (2.417)
MC×MEDIA				0.191 * (1.834)
SIZE	0.526 *** (7.336)	0.856 *** (13.764)	0.970 *** (11.058)	0.934 *** (9.793)
DEBT	0.069 (1.179)	−0.104 (−1.624)	−0.077 (−1.283)	−0.038 (−0.585)
F	99.786 ***	63.983 ***	83.550 ***	73.217 ***
Adj R^2	0.847	0.780	0.823	0.802
Year	Controlled	Controlled	Controlled	Controlled
N	2580	2580	2580	2580

The superscript asterisks ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

From the analysis of the results of H5b, we concluded that the independent variable, independent directors' characteristics, is negatively correlated with the enterprise's environmental protection investment. The intersection term of media coverage and board characteristics correlated positively with the enterprise's environmental protection investment. However, they are not significant, indicating that media attention has no moderating effect on the impact of independent variables and dependent variables. At the same time, in agreement with model (2), the adjusted R^2 is 0.780, and the regulation of R^2 in model (5b) is 0.780. Additionally, the moderating effect ΔR^2 is 0, indicating no regulatory effect. Therefore, H5b is denied.

Moreover, model (5c) showed that there is a positive correlation between the characteristics of the board of supervisors and media coverage at the level of 1%, indicating that media coverage has an enhanced regulatory effect on the characteristics of the board of supervisors and enterprise environmental protection investment. Therefore, media coverage strengthens the positive impact of the characteristics of the board of supervisors

on the enterprise's environmental protection investment, and the moderating effect is 0.823 − 0.805 = 0.018. Hence, H5c is verified.

With H5d, the multiplier coefficient of management characteristics and media coverage is 0.191, significant at the level of 10%. Thus, media coverage has an enhancing regulatory effect on management characteristics and enterprise environmental protection investment. Media coverage strengthens the positive impact of management characteristics on enterprise environmental protection investment, and the moderating effect is 0.802 − 0.797 = 0.005. In conclusion, H5d is verified.

4.4. Further Analysis

Media reports are further divided into positive coverages and negative coverages for regression (Tables 8 and 9). MEDIAp is the positive media coverage variable, and MEDIAn is the negative media coverage variable. It was observed that the equity structure, the characteristics of the board of supervisors, the characteristics of the management, and the intersection of the positive media reports are significant (Table 8). However, the characteristics of the board of directors are not significant. This result is also consistent with the regression results of the moderating effect of all media coverages. The regression results in Table 9 show that all cross-multiplication terms are not significant. Comparing the positive and negative coverage results, the coefficient of the intersection term of positive reports and independent variables is more significant than that of negative reports. This result suggests that the more positive the information reported by the media, the more listed companies in highly polluting industries will pay attention to the environment and environmental governance, resulting in more positive environmental investment decision-making. According to the analysis results, the moderating effects of positive and negative media coverage are different. The main reasons are as follows: based on the cost-benefit relationship, as environmental protection investment is a long-term investment, the generation of benefits might not necessarily appear in the current period, especially those of the social and environmental benefits. Therefore, when an enterprise has illegal environmental behavior and is negatively covered by the media, the enterprise will first adopt "bleaching" or "bleaching green." Other public relations mean to consider the social reputation. This is a short-term effect. Its purpose is to eliminate the negative crisis caused by negative coverages, reverse the adverse social reputation, and then encourage long-term environmental protection investments or governance.

Table 8. Regression of the moderating effect of positive media coverage.

Variable	Model (5a) EPI	Model (5b) EPI	Model (5c) EPI	Model (5d) EPI
SQ	−0.274 *** (−5.233)			
MEDIAp	0.455 *** (4.449)			
SQ×MEDIAp	−0.267 *** (−3.152)			
DB		−0.130 * (−1.898)		
MEDIAp		−0.404 (−1.111)		
DB×MEDIAp		0.585 (1.502)		
RBS			0.344 *** (4.489)	
MEDIAp			0.254 ** (2.351)	

Table 8. *Cont.*

Variable	Model (5a) EPI	Model (5b) EPI	Model (5c) EPI	Model (5d) EPI
RBS×MEDIAp			0.289 *** (3.104)	
MC				0.243 *** (3.124)
MEDIAp				0.311 ** (2.425)
MC×MEDIAp				0.200 * (1.878)
SIZE	0.510 *** (6.987)	0.844 *** (13.625)	0.977 *** (11.246)	0.924 *** (9.436)
DEBT	0.080 (1.353)	−0.091 (−1.421)	−0.076 (−1.259)	−0.033 (−0.497)
F	101.277 ***	65.389 ***	83.723 ***	73.227 ***
Adj R^2	0.849	0.783	0.823	0.802
Year	Controlled	Controlled	Controlled	Controlled
N	2580	2580	2580	2580

The superscript asterisks ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 9. Regression of the moderating effect of negative media coverage.

Variable	Model (5a) EPI	Model (5b) EPI	Model (5c) EPI	Model (5d) EPI
SQ	−0.228 *** (−3.386)			
MEDIAn	0.116 (1.475)			
SQ×MEDIAn	−0.072 (−0.838)			
DB		−0.000 (−0.003)		
MEDIAn		0.627 (1.353)		
DB×MEDIAn		−0.562 (−1.218)		
RBS			0.340 *** (4.051)	
MEDIAn			0.118 (1.368)	
RBS×MEDIAn			0.167 (1.590)	
MC				0.246 *** (2.884)
MEDIAn				0.080 (0.859)
MC×MEDIAn				0.017 (0.165)
SIZE	0.738 *** (13.213)	0.893 *** (15.441)	1.074 *** (15.974)	1.068 *** (13.767)

Table 9. *Cont.*

Variable	Model (5a) EPI	Model (5b) EPI	Model (5c) EPI	Model (5d) EPI
DEBT	−0.107 ** (−2.141)	−0.175 *** (−3.291)	−0.158 *** (−3.203)	−0.140 (−2.758)
F	80.468 ***	62.407 ***	76.101 ***	69.027 ***
Adj R^2	0.817	0.775	0.808	0.793
Year	Controlled	Controlled	Controlled	Controlled
N	2580	2580	2580	2580

The superscript asterisks ***, ** denote statistical significance at the 1%, 5% levels, respectively.

In addition, the impact of media coverage on enterprises requires time for a response and buffer. Therefore, the paper further analyzes the impact of media coverage on enterprises lagging behind one period to study the long-term impact of media coverage and regresses the value of the explained variable, EPI, lagging behind one period. The results are consistent with our previous results. Therefore, the more media coverage, the more positive the role of related variables on environmental protection investment. The role lags for a certain time, which impacts the subsequent development of enterprises. Due to the limited space in the article, only the regression results of 5a are reported in Table 10.

Table 10. Regression analysis of the moderating effect of media coverage in lag phase I.

Variable	Model (5a) EPI	Model (5a) EPI	Model (5a) EPI
SQ	−0.270 *** (−4.512)		
MEDIA	0.380 *** (3.344)		
SQ×MEDIA	−0.243 ** (−2.545)		
SQ		−0.275 *** (−4.611)	
MEDIAp		0.401 *** (3.446)	
SQ×MEDIAp		−0.258 *** (−2.674)	
SQ			−0.248 *** (−3.382)
MEDIAn			0.930 (1.084)
SQ×MEDIAn			−0.042 (−0.452)
SIZE	0.527 *** (6.485)	0.513 *** (6.191)	0.715*** (11.724)
DEBT	0.065 (0.972)	0.073 *** (1.087)	−0.080 (−1.464)
F	73.998 ***	74.615 ***	64.773 **
Adj R^2	0.804	0.805	0.782
Year	Controlled	Controlled	Controlled
N	2580	2580	2580

The superscript asterisks ***, **, denote statistical significance at the 1%, 5% levels, respectively.

4.5. Robustness Test

In order to further verify the stability of the model, the robustness test was carried out as follows: (1) Replace the characteristic variables of the management and the board of supervisors. This paper uses the natural logarithm of the remuneration of the board of supervisors and the natural logarithm of the management's remuneration to replace the original ratio of the remuneration of the board of supervisors to the total assets and the ratio of the remuneration of the management to the total assets. The method of taking the natural logarithm also eliminates the influence of enterprise scale. (2) Replace media coverage. Media coverage can be divided into newspaper media coverage and network media coverage. Additionally, the type of media coverage used in the full sample regression is newspaper media coverage. These data are derived from China's full-text newspaper database, including all paper media reports on high-pollution industries. However, because environmental protection investment belongs to the financial information of enterprises, the authority and coverage of financial newspapers strongly influence the reporting of financial information. Furthermore, with the development of network media, the focus and coverage of enterprise stakeholders on network media are gradually increasing. Therefore, in this paper, robustness is tested with regard to the following two aspects: (i) a number of reports in eight financial newspapers (such as China Securities Journal, Securities Daily, Securities Times, Financial Times, The Economic Observer, The First Financial Daily, 21st Century Economic Report, and China Business Daily) are selected to replace the coverage of paper media; (ii) a number of online media reports are selected to replace the number of paper media reports. After the regression of the whole sample, the regression and moderating effect test with one lag period are also carried out. After the test, the results are consistent with the previous text, and the previous conclusion is still valid. Therefore, the research conclusion of this paper is more reliable. Due to the limited space of the article, the results of models (1)–(4) and model (5a) are reported here, as shown in Tables 11 and 12.

Table 11. Robustness tests (1).

	Financial Newspaper Reports				**Online Media Reports**			
	Model (1)	**Model (2)**	**Model (3)**	**Model (4)**	**Model (1)**	**Model (2)**	**Model (3)**	**Model (4)**
SQ	−0.415 *** (−7.874)				−0.404 *** (−7.275)			
DB		−0.085 (1.572)				−0.051 (−0.929)		
RBS			0.420 *** (9.582)				0.423 *** (8.921)	
MC				0.143 ** (2.321)				0.154 *** (2.466)
MEDIA	0.190 *** (3.754)	0.237 *** (3.575)	0.152 *** (3.270)	0.227 *** (3.521)	0.126 *** (2.586)	0.183 *** (2.945)	0.065 (1.388)	0.199 *** (3.284)
Control	YES	YES	YES	YES	YES	YES	YES	YES
YEAR	YES	YES	YES	YES	YES	YES	YES	YES
F	165.375 ***	89.797 ***	203.213 ***	93.499 ***	151.421 ***	85.127 ***	182.650 ***	91.596 ***
Adj R^2	0.881	0.800	0.901	0.806	0.871	0.791	0.891	0.803

The superscript asterisks *** and ** denote statistical significance at the 1% and 5% levels, respectively.

Table 12. Robustness tests (2).

	Financial Newspaper Reports			Online Media Reports		
	Model (5a)	**Model (5a)**	**Model (5a)**	**Model (5a)**	**Model (5a)**	**Model (5a)**
SQ	−0.236 ** (−2.563)	−0.212 * (−1.744)	−0.521 *** (−5.968)	−0.015 (09.987)	−0.061 (−0.418)	−0.402 *** (−4.620)
MEDIA	0.259 ** (4.513)			0.305 *** (3.474)		
SQ×MEDIA	−0.208 ** (2.235)			−0.402 *** (−2.575)		
MEDIAp		0.249 *** (3.219)			0.303 *** (3.242)	
SQ×MEDIAp		−0.228 *** (1.971)			−0.353 *** (−2.643)	
MEDIAn			−0.055 (−0.683)			0.062 (0.734)
SQ×MEDIAn			0.148 (1.415)			−0.036 (−0.345)
Control	YES	YES	YES	YES	YES	YES
YEAR	YES	YES	YES	YES	YES	YES
F	140.446 ***	126.080 ***	114.691 ***	128.463 ***	125.626 ***	111.189 ***
Adj R^2	0.887	0.875	0.865	0.877	0.875	0.861

The superscript asterisks ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

5. Conclusions and Implications

5.1. Discussion and Conclusions

Based on the empirical data of listed companies in China's A-share high-pollution industries from 2015 to 2019, this paper measures the level of environmental protection investment of enterprises by integrating environmental protection investment and governance. Corporate governance is divided into four dimensions: shareholding structure, characteristics of independent directors, characteristics of the board of supervisors, and characteristics of the management. Media coverage is taken, and control variables such as corporate characteristics and debt characteristics are incorporated. A moderating effect model is adopted to fix the annual effect. The relationship between corporate governance, media attention, and environmental protection investment is empirically studied, clarifying the role of corporate governance and the effect of media attention on the environmental protection investment of enterprises. The specific conclusions are as follows:

(1) The strengthening of corporate governance can significantly promote the environmental protection investment behavior of enterprises. From the empirical results, the rationality of the shareholding structure, the characteristics of the board of supervisors and the ability of the management all show a significant promotion ability at a certain level, indicating that good corporate governance can promote an increase in the environmental protection investment of enterprises, thus further improving business performance and achieving the sustainable development of enterprises. In corporate governance, the shareholding structure is at the core. Because the controlling shareholders tend towards the economic value of the enterprise and their behavior is somewhat short-sighted, the management of the enterprise holds a negative attitude towards the environmental protection investment of social value with long-term effects and tends to not actively invest. However, based on Agency Theory and Upper Echelons Theory, the management of an enterprise has more company information than its shareholders. In the context of global low-carbon development and the dual-carbon policy proposed by China, with the help of its own management ability, the management can also rationally analyze the development and

opportunities faced by the enterprise and, at the same time, engage in better planning and decision making for the long-term development of the enterprise. Although environmental protection investment increases the cost burden of the enterprise in the short term, the measures to cater to low-carbon development will help enterprises to attain development space in the future. Regarding the supervisory role of the board of supervisors, it can also be seen that reasonable corporate governance can promote an increase in the environmental protection investment of enterprises. (2) Media coverage can positively adjust the impact of corporate governance on environmental protection investment. Through the analysis of the moderating effect model, the results show that the media coverage of the company can strengthen the relationship between the equity structure, the characteristics of the board of supervisors and of the management, and the environmental protection investment of the enterprise. The function of the media lies in information dissemination and supervision, and governance. Based on the information transmission theory, the more media reports there are on the enterprise environment, the more information asymmetry can be reduced, thus reducing the cost of information acquisition by stakeholders and enabling stakeholders to make better judgments about the enterprise. Further supervision and governance are reflected in the impact of media reports on the social reputation of enterprises, which will also attract the attention of the government and other relevant regulatory authorities, forcing enterprises to improve relevant governance behaviors and corporate governance. Therefore, media attention can effectively promote the company's investment in environmental protection. When the number of positive media reports on environmental governance increases, it brings with it a positive atmosphere, improves the social influence and reputation of the enterprise, increases the social recognition of the enterprise, and results in greater social value and long-term value. In this condition, from the perspective of cost-effectiveness, enterprises only need to pay fewer costs, which will result in more corporate benefits and promote enterprises to invest more in environmental protection.

However, negative media reports did not show a moderating effect, indicating that such reports could not effectively promote the role of corporate governance in environmental protection investment to address the violations of enterprises. This is because negative reports can attract the attention of stakeholders, have an adverse social impact on enterprises, and encourage stakeholders to make adverse judgments and decisions about enterprises. However, the research conclusions of this paper reflect that enterprises may have public relations crises due to the behavior of negative reports. Fan et al. [75] found that the number of negative media reports was significantly negatively correlated with corporate performance. After introducing the public relations crisis variable, they found that such crises alleviated the decline in negative media reports on corporate performance, thus indicating that when enterprises were caught in negative reports, they would use the means of a public relations crisis to reduce the adverse impact on the enterprise. Therefore, whether the economic consequences of a corporate public relations crisis have an impact on corporate environmental governance is a question that this paper raises for follow-up research.

5.2. Implications

Based on our findings, we put forward the following suggestions. First, enterprises, society, and government should bear the environmental problem to aid economic development. Additionally, the media should supervise the enterprises. Therefore, we should strengthen environmental publicity and education, improve the environmental awareness of the public, and improve public supervision through various measures. Secondly, an environmental performance evaluation or rating system that is suitable for Chinese listed companies should be explored. In addition, the relevant environmental benefit indicators should be integrated into the system to evaluate the level of involvement of senior management in the companies. Such a practice would strengthen the high-level environmental protection concept and promote enterprises' benign competition, which would improve environmental benefits. Finally, the theoretical research of environmental accounting is

further extended to the practical application level to solve the specific accounting problems of enterprises encountered in practice. Such problems include determining the discount rate and total cost of pollution control projects, making decisions about pollution control, or purchasing emission rights. These problems also involve establishing internal management, evaluation, or incentive mechanisms of environmental accounting to promote the realization of enterprise emission reduction targets.

The limitations of this paper are as follows: (1) The high-pollution industries selected as the research object are highly representative, but listed companies in non-high-pollution industries are not considered. This is because the environmental protection law does not require environmental information disclosure for non-high-pollution industries. Therefore, it is difficult to obtain the data of listed companies in non-high-pollution industries, thereby limiting the research scope. (2) Other factors affecting the environmental protection investment of enterprises, such as the availability of incentives, funding capital, external stakeholder pressure (industry/sector), etc., have not been considered yet, which may limit the findings of this paper.

Future research directions include the following: (1) Whether and how the environmental protection tax law implemented in China since 1 January 2019 has impacted enterprise environmental protection investment by providing new, innovative directions should be investigated. (2) On 24 May 2021, the Ministry of Ecology and Environment of China issued a reform plan for the legal disclosure system of environmental information. It defined the subject of mandatory environmental information disclosure and added specific enterprises in non-highly polluting industries. Therefore, it improved the expansion of follow-up research samples and the scope of data acquisition. (3) In recent years, there has been an increasing study about Benefit Corporations (referred to as B Corps). B Corps are enterprises that meet the highest social and environmental standards of humanity. They do not aim to maximize profits but rather to solve social and environmental problems and promote sustainable development of enterprises [76,77]. How highly-polluting enterprises can achieve environmental governance through environmental investment and transform into B Corp is a direction that can be studied in the future.

Author Contributions: Y.W. and J.Z. contributed to the study's conception and design. The first draft of the manuscript was written by Y.W. and all authors commented on previous versions of the manuscript. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the National Natural Science Foundation of China, grant number 72072143.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data are available from the corresponding author upon reasonable request.

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

References

1. Ren, G.Q.; Zhou, X.Y.; Li, X.Y.; Liu, L. Nature of Property Right, Corporate Governance and Enterprise Environmental Behavior. *J. Beijing Inst. Technol. Soc. Sci. Ed.* **2021**, *23*, 44–55.
2. Peng, F.; Li, B.D. Analysis of Environment Protection Investment. *Environ. Sci. Technol.* **2005**, *5*, 72–74.
3. Zhou, Y.; Zhang, X.D.; Zhao, Y.; Chen, L.Y.; Xue, L. Industrial development and environmental performance under the regulation of green governance. *China Popul. Resour. Environ.* **2018**, *9*, 82–92.
4. Berman, E.; Bui, L.T. Environmental Investment regulation and Productity: Evidence from Oil Refineries. *Rev. Econ. Stat.* **2001**, *83*, 498–510. [CrossRef]
5. Fan, Q.Q.; Zhang, T.B. A Study of Environmental Regulations and Pollution Abatement Mechanism on China's Economic Growth Path. *J. World Econ.* **2018**, *8*, 171–192.
6. Papagiannakis, G.; Lioukas, S. Values, attitudes and perceptions of managers as predictors of corporate environmental responsiveness. *J. Environ. Manag.* **2012**, *7*, 41–45. [CrossRef]
7. Kagan, R.A.; Thornton, D.; Guningham, N. Explaining Corporate Environmental Performance: How does Regulation Matter? *Law Soc. Rev.* **2003**, *37*, 51–90. [CrossRef]

8. Li, Y. An empirical study on the impact of environmental regulation on technological innovation in manufacturing industry. *Hubei Soc. Sci.* **2021**, *5*, 93–99.
9. Li, H.; Zou, Q. Environmental Regulations, Resource Endowments and Urban Industry Transformation: Comparative Analysis of Resource-based and Non-resource-based Cities. *Econ. Res. J.* **2018**, *53*, 182–198.
10. Zhang, C.Y.; Sheng, B.; Su, D.N. Environmental Regulation, Performance Appraisal and the Location of Enterprises. *Bus. Manag. J.* **2018**, *40*, 21–38.
11. Zou, G.W.; Zhou, Z.J. Environmental Regulation, Government Competition and Performance of Industrial Enterprises: Based on Difference-in-Difference Model. *J. Zhongnan Univ. Econ. Law* **2018**, *231*, 13–21.
12. Cormier, D.; Ledoux, M.J.; Magnan, M. The Informational Contribution of Social and Environmental Disclosures for Investors. *Manag. Decis.* **2011**, *49*, 1276–1304. [CrossRef]
13. Bi, Q.; Peng, J.; Zuo, Y.Y. Environment Information Disclosure System, Corporate Governance and Environment Information Disclosure. *Account. Res.* **2012**, *7*, 39–47+96.
14. Zhang, H.Y.; Yang, G.; Wei, X.B.; Chen, Z. An empirical study on the impact of internal governance on corporate environmental information disclosure. *Stat. Decis.* **2019**, *14*, 183–185.
15. Ren, Y.J.; Zhang, K.H. Study on the correlation between public pressure, corporate governance and environmental cost. *Res. Financ. Econ. Issues* **2016**, *10*, 93–100.
16. Mohamed, E.H.A.; Guglielno, M.G.; Christophe, R.; Sova, R.; Sova, A. Environmental Regulation and Competitiveness: Evidence from Romania. *Ecol. Econ.* **2012**, *81*, 130–139.
17. Ren, G.Q. A Study of Enterprises' Investment Behavioron Environmental Protection Based on Corporate Governance. *J. Zhengzhou Univ. Philos. Soc. Sci. Ed.* **2017**, *50*, 66–71+159.
18. Wang, X.P.; Zhang, Z.M.; Guo, Z.H.; Su, C.; Sun, L.H. Energy Structure Transformation in the Context of Carbon Neutralization: Evolutionary Game Analysis Based on Inclusive Development of Coal and Clean Energy. *J. Clean. Prod.* **2023**, *398*, 136626. [CrossRef]
19. Yuan, X.F.; Wu, Y.T.; Sun, L.H.; Wang, X.P. Research on Efficient Construction Paths for Intelligent Coal Mines in China from the Configuration Perspective. *Appl. Sci.* **2023**, *13*, 673. [CrossRef]
20. Wang, Y.; Li, Y.X.; Ma, Z.; Song, J.B. Media Coverage, Environmental Regulation and Corporate Environment Behavior. *Nankai Bus. Rev.* **2017**, *20*, 83–94.
21. Carroll, C.E.; Mccombs, M. Agenda-setting Effects of Business News on the Public's Images and Opinions about Major Corporations. *Corp. Reput. Rev.* **2003**, *6*, 36–46. [CrossRef]
22. Dyck, A.; Volchkova, N.; Zingales, L. The Corporate Governance Role of the Media: Evidence from Russia. *J. Financ. Res.* **2008**, *63*, 1093–1135. [CrossRef]
23. Bednar, M.K.; Boivie, S.; Prince, N.R. Burr Under the Saddle: How Media Coverage Influences Strategic Change. *Organ. Sci.* **2013**, *24*, 910–925. [CrossRef]
24. Kassinis, G.; Vafeas, N. Stakeholder Pressuresand Environmental Performance. *Acad. Manag. J.* **2006**, *49*, 145–159. [CrossRef]
25. Yang, D.G.; Chen, H.W.; Liu, Q.L. Media Pressure and Corporate Innovation. *Econ. Res. J.* **2017**, *52*, 125–139.
26. Shleifer, A.; Vishny, A. Large shareholders and corporate control. *J. Polit. Econ.* **1986**, *95*, 599–617. [CrossRef]
27. Yang, D.; Wang, Z.; Lu, F. The Influence of Corporate Governance and Operating Characteristics on Corporate Environmental Investment: Evidence from China. *Sustainability* **2019**, *11*, 2737. [CrossRef]
28. Jiang, X.M.; Xu, C.X. Environmental Regulation, Corporate Governance and Environmental Protection Investment of Enterprises. *Financ. Account. Mon.* **2015**, *27*, 9–13.
29. Yuan, Z.M.; Ning, J.H.; Jin, Y. The Impact of Senior Executives' Academic Experience on Environmental Protection Investment. *Financ. Account. Mon.* **2019**, *14*, 12–20.
30. Liu, Y.X.; Qi, H.J.; Liu, S.Q. Margin Trading, Managers' Confidence and Corporate Environmental Investment. *J. Zhongnan Univ. Econ. Law* **2020**, *5*, 102–112+159.
31. Jiao, H.; Jiao, J.; Liu, R.M. Government quality, corporate governance structure and investment decision-making—An Empirical Study Based on the survey data of World Bank Enterprises. *Manag. World* **2017**, *10*, 66–78.
32. Huang, J.; Zhou, C.N. Empirical Research on the Impact of Ownership Structure and Management Behavior on the Environmental Disclosure: Evidence from Heavy Polluting Industries Listed in Shanghai Stock Exchange. *China Soft Sci.* **2012**, *1*, 133–143.
33. Meng, X.Z.; Zhang, J.R.; Cheng, Z.J. Corporate Pyramids, Investor Protection and Related Guarantees—The Analysis Based on Control Rights and Cash-Flow Rights. *J. Shanxi Univ. Financ. Econ.* **2015**, *37*, 11–20.
34. La, P.R.; Lopez, F.; Shleifer, A. Corporate ownership around the world. *J. Financ.* **1999**, *54*, 471–517.
35. Li, Y.X.; Ji, X.X. Deviation of Controlling Shareholder's Control Right from Cash Flow Right: Research Review Base on Perspective of Type-II Agency Problem. *Technol. Econ.* **2017**, *7*, 128–133.
36. Stija, C.; Simeon, D.; Joseph, P.; Fan, H.; Larry, H.; Lang, P. Disentangling the Incentive and Entrenchment Effects of Large Shareholdings. *J. Financ.* **2002**, *57*, 2741–2771.
37. Karl, V.L. Equity ownership and firm value in emerging markets. *J. Financ. Quant. Anal.* **2003**, *38*, 159–184.
38. Xue, Y.Z.; Liu, X. Nature of Ownership, the Separation of Cash Flow Right and Voting Right and Corporate Risk-taking—Based on the Second Agency Problem. *J. Shanxi Univ. Financ. Econ.* **2014**, *2*, 93–103.

39. Tang, G.P.; Li, L.H. Ownership structure, property right nature and enterprise environmental protection investment—Empirical Evidence from Chinese A-share listed companies. *Res. Financ. Econ. Issues* **2013**, *3*, 93–100.
40. Chen, G.H.; Hu, X.; Liu, B. Corporate Governance, the Quality of Information Disclosure and Informed Trading. *J. Audit. Econ.* **2015**, *30*, 55–65.
41. Wang, F.Z.; Chen, F.Y. Board governance, environmental regulation and green technology innovation—Empirical test based on listed companies in China's heavy polluting industry. *Stud. Sci. Sci.* **2018**, *36*, 361–369.
42. Forker, J.J. Corporate governance and disclosure quality. *Account. Bus. Res.* **1992**, *86*, 111–124. [CrossRef]
43. Beasley, M.S. An empirical analysis of the relation between the board of director composition and financial statement fraud. *Account. Rev.* **1996**, *71*, 443–465.
44. Xie, D.M.; Wang, P. Tax-reducing Incentives, the Scale of Independent Directors and Environmental Protection Investment of Heavily Polluting Enterprises. *Account. Res.* **2021**, *8*, 137–152.
45. Liu, M.P. A study on the corporate governance and the disclosure of environmental information based on the listed companies in Guangdong Province. *Jinan J. Philos. Soc. Sci.* **2013**, *9*, 50–57+161–162.
46. 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]
47. Yao, W.F.; Lu, T. The Construction of Supervisory Board and Firm's Efficiency. *Nanjing J. Soc. Sci.* **2010**, *7*, 21–25+52.
48. Qing, S.S. An empirical analysis of the relationship between the characteristics of the board of supervisors and corporate performance. *J. Cap. Univ. Econ. Bus.* **2008**, *3*, 51–55.
49. Ren, G.Q.; Xu, R.; Li, Y.X. Structure Characteristics and Supervision Effectiveness of State-Owned Assets Holding and Board of Supervisors. *Reform Econ. Syst.* **2019**, *2*, 156–163.
50. Zhou, H.; Deng, S. Executive Compensation and Environmental Performance: From a Perspective of External Governance Environment of Listed Companies. *J. Shanghai Univ. Financ. Econ.* **2017**, *5*, 27–39.
51. Sheng, M.Q.; Che, X. Managerial Power, Executive Compensation and Corporate Financial Performance. *J. Cent. Univ. Financ. Econ.* **2016**, *5*, 97–104.
52. Sheng, M.Q.; Wu, Q.; Zhang, C.Q. Management Background Characteristics, Compensation Incentives and Enterprise Competitiveness. *J. Jiangxi Univ. Financ. Econ.* **2017**, *6*, 32–41.
53. Berrone, P.; Gomez-Mejia, L.R. Environmental Performance and Executive Compensation: An Integrated Agency Institutional Perspective. *Acad. Manag. J.* **2009**, *52*, 103–126. [CrossRef]
54. Gerhart, B.; Milkovich, G. Organizational Differences in Managerial Compensation and Financial Performance. *Acad. Manag. J.* **1990**, *33*, 663–691. [CrossRef]
55. Wu, Y.H.; Wu, S.N. Ownership concentration, tunneling, and managerial entrenchment. *J. Manag. Sci. China* **2011**, *14*, 34–44.
56. Zou, H.L.; Zeng, S.X.; Lin, H.; Xue, X.M. Top Executives' Compensation, Industrial Competition, and Corporate Environmental Performance: Evidence from China. *Manag. Decis.* **2015**, *53*, 2036–2059. [CrossRef]
57. Wang, K.W.; Wen, M.L.; Qian, L.K.; Jhong, J.L. Management characteristics and corporateper formance of Chinese chemical companies: The moderating effect of managerial ability. *Int. Trans. Oper. Res.* **2021**, *28*, 976–995. [CrossRef]
58. Zhang, J.J.; Yu, L.C.; Bi, Q.; Pan, J. Media Supervision, Environmental Regulation and Firm Green Investment. *J. Shanghai Univ. Financ. Econ.* **2016**, *18*, 91–103.
59. Fang, L.; Peress, J. Media Coverage and the Cross-section of Stock Returns. *J. Financ.* **2009**, *64*, 2023–2052. [CrossRef]
60. Wang, B.; Ye, Y.; Li, M. Review and Prospects on the Role of the Media on Corporate Governance. *East China Econ. Manag.* **2014**, *28*, 142–146.
61. Craven, B.M.; Marston, C.L. Investor Relations and Corporate Governance in Large UK Companies. *Corp. Gov. Int. Rev.* **1997**, *5*, 137–151. [CrossRef]
62. Dyck, A.; Zingales, L. Private Benefits of Control: An International Comparison. *J. Financ.* **2004**, *59*, 537–600. [CrossRef]
63. Pan, A.L.; Liu, X.; Qiu, J.L.; Shen, Y. Can Green M&A of Heavy Polluting Enterprises Achieve Substantial Transformation under the Pressure of Media. *China Ind. Econ.* **2019**, *2*, 174–192.
64. Zhang, Y.M.; Xing, C.; Zhang, Y. The Impact of Media Coverage on Green Technology Innovation of High-Polluting Enterprises. *Chin. J. Manag.* **2021**, *18*, 557–568.
65. Qi, Z.; Zhi, Y.; Dongmin, K. The real effect of legal institutions: Environmental courts and firm environmental protection expenditure. *J. Environ. Econ. Manag.* **2019**, *98*, 102254.
66. Yang, L.Y.; Zhang, Z.Y.; Zheng, J.M. Does Central Government Environmental Inspection Promote Firm Environmental Protection Expenditure?—Evidences from Listed Companies in China. *J. Zhejiang Univ. Humanit. Soc. Sci.* **2021**, *51*, 95–116.
67. Zhang, Q.; Zheng, Y.; Kong, D.M. Local Environmental Governance Pressure, Executive's Working Experience and Enterprise Investment in Environmental Protection: A Quasi-natural Experiment Based on China's "Ambient Air Quality Standards 2012". *Econ. Res. J.* **2019**, *6*, 183–198.
68. Chen, Q. Does environmental investment contribute to firm productivity? An empirical analysis based on the mediation role of firm innovation. *NanKai Econ. Stud.* **2020**, *6*, 80–100.
69. Hu, Y.L.; Cui, D. The empirical study on the influence factors of enterprise investment in environment protection. *Ecol. Econ.* **2019**, *35*, 161–166.

70. Cui, Y.G.; Zhou, C.; Wang, Z. Impact of regional pollution control investment on enterprises' environmental cost. *Public Financ. Res.* **2019**, *3*, 115–129.
71. Wang, L.Y. Environmental cost and GDP effectiveness. *Audit. Res.* **2015**, *3*, 3–11+94.
72. Yu, H.Z.; Wang, B.; Yang, Y. "People Oriented" environmental costs control model—Based on a case study of the fourth gas production plant of Changqing oilfield company. *Financ. Econ.* **2014**, *8*, 129–140.
73. Tang, G.P.; Li, L.H.; Wu, D.J. Environmental regulation, industry attributes and corporate environmental investment. *Audit. Res.* **2013**, *6*, 83–89+96.
74. Tang, G.P.; Li, L.G. Structure and distribution characteristics of corporate environmental investment: Empirical evidence from A-Share Listed Companies. *J. Audit. Econ.* **2013**, *28*, 94–103.
75. Fan, L.; Jin, Y.; Yuan, Z.M. Media Supervision, Crisis Public Relations and Enterprise Performance. *Financ. Account. Mon.* **2017**, *12*, 46–52.
76. Burger-Helmchen, T.; Siegel, E.J. Some Thoughts on CSR in Relation to B Corp Labels. *Entrep. Res. J.* **2020**, *10*, 20200231. [CrossRef]
77. Diez-Busto, E.; Sanchez-Ruiz, L.; Fernandez-Laviada, A. The B Corp Movement: A Systematic Literature Review. *Sustainability* **2021**, *13*, 2508. [CrossRef]