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Influencing Factors and Mechanisms of Corporate Social Responsibility Reputation under Green and Low-Carbon Transition: Evidence from Chinese Listed Companies

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Abstract: Amid China's pursuit of a green and low-carbon transition, corporate social responsibility (CSR) is facing new challenges. Our research delves into the influencing factors and mechanisms for CSR reputation under green and low-carbon transition and provides practical enlightenment for enterprises to achieve sustainable development. This paper constructs a comprehensive index system of CSR from five dimensions (innovation, coordination, sustainability, openness, and sharing), and CSR reputation of China's A-share listed companies is comprehensively estimated by using an entropy method and data from 2013 to 2021. Then, from the perspective of external supervision and internal governance, we discuss the influence factors of CSR reputation, with an emphasis on the impact of public environmental concerns. Finally, the realization mechanism of CSR is further revealed. It is found that public environmental concern and the expansion of the enterprise scale boost the enhancement of CSR reputation. However, a higher proportion of female managers tends to hinder CSR reputation. Furthermore, public environmental concern plays a more prominent role in improving CSR reputation of non-state-owned and eastern enterprises. Additionally, public environmental concern significantly enhances CSR reputation through green technology innovation and executive environmental awareness. This research provides valuable insights for improving CSR reputation and optimizing regulatory compliance and governance practices.

Keywords: corporate social responsibility; public environmental concern; enterprise scale; female participation; green technology innovation; executive environmental awareness; green and low-carbon transition

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1. Introduction

The triple bottom line of corporate social responsibility includes economic prosperity, social justice, and environmental quality [1]. As China's economy enters the stage of high-quality development, Chinese enterprises are experiencing rapid growth and making significant contributions to the stability and prosperity of society. Despite the increasing number of businesses and their improved operational performance, many issues still affect their relationships with consumers, employees, and society at large. One of these is the lack of a strong sense of CSR. According to the Blue Book of Corporate Social Responsibility (2022), the CSR index of China's top 300 enterprises in 2022 was only 36.4 points, and 124 enterprises were still "on the sidelines". Another problem is that CSR is currently more limited to economic and charitable responsibilities rather than constantly broadening its scope of responsibility to meet the development goals of the new era. In particular, China's ecological civilization construction has entered a critical period where carbon reduction has become a key strategic direction. Low-carbon transformation has become a

social responsibility that enterprises must undertake. Achieving peak carbon emissions and carbon neutrality requires widespread collaboration across society. As significant economic entities, businesses should keep pace with the times, respond to the national "carbon peaking and carbon neutrality" goals, actively fulfill environmental and social responsibilities, and achieve sustainable development.

On 21 July 2020, General Secretary Xi Jinping's speech at the entrepreneur forum clearly outlined the "social responsibilities that enterprises need to fulfill". He stated: "Only entrepreneurs who sincerely contribute to society and fulfill their social responsibilities can truly gain societal recognition, embodying the requirements of the times". Therefore, entrepreneurs in the new era are required to contribute to improving business efficiency and performance and actively fulfill the mission of serving society. They should play a more significant role in ecological conservation, consumer services, supply chain management, charitable activities, and other fields, truly shouldering the responsibility of giving back to society. Thus, research on enhancing CSR reputation has become a focal point of various sectors of society. This research holds significant practical significance for improving the overall strength of enterprises, promoting the coordinated development of economic growth and ecological environment protection, and embarking on a path towards higher quality, people-centered enterprise development.

Nowadays, being engaged in CSR has become a widely recognized and necessary responsibility for enterprises [2]. The academic research on CSR has progressed from debating its importance to exploring how to integrate CSR strategically and effectively [3]. Since the 1990s, many well-known foreign enterprises have regarded CSR as a core business development component. In recent years, Chinese enterprises have also begun to attach importance to social responsibility, with a noticeable increase in both the quantity and quality of CSR. The literature review shows that many internal and external factors influence the extent to which corporations fulfill their CSR. These factors include supply chain pressure from foreign investment enterprises [4], media attention [5], geographical distance, and regulatory environments [6]. From an internal perspective, the research has primarily focused on executive characteristics, such as the education level, executive compensation [7], the level of internal digital transformation [8], and team stability [9]. These factors are believed to impact CSR reputation. Moreover, undertaking CSR not only reduces capital costs [10], strengthens competitive advantage [11], gains political resources [12,13], attracts green investment [14], and manages risks [15] but also alleviates financing constraints [16]. Therefore, fulfilling social responsibility is an altruistic behavior consistent with business ethics and an effective means to improve financial performance [17], which embodies corporate soft power.

While an increasing number of scholars are paying attention to the impact of CSR on the future development of enterprises, there is still significant room for expanding research on the factors affecting CSR reputation. Based on the goal of green and low-carbon transformation, this study constructs a comprehensive evaluation index system of CSR reputation from five dimensions: innovation, coordination, sustainability, openness, and sharing. Then, the CSR of China's A-share listed companies in the Shanghai and Shenzhen stock exchanges is comprehensively estimated by using an entropy method and data from 2013 to 2021. Subsequently, we use two-way fixed effect and intermediary effect models to empirically analyze the influencing factors and driving mechanisms of CSR reputation. The empirical results indicate that public environmental concerns can drive the enhancement of CSR reputation. Similarly, the expansion of the enterprise scale is associated with better fulfillment of social responsibility. However, a higher proportion of female managers inhibits improving CSR reputation. Heterogeneity tests reveal that, compared with state-owned enterprises, non-state-owned enterprises benefit more from the positive effect of public environmental concern on CSR reputation. Additionally, the promoting effect of public environmental concern on CSR reputation is more significant for companies in the east region than those in China's western, central, and northeastern regions. The

mechanism analysis results suggest that public environmental concern enhances CSR reputation through green technology innovation and executive environmental awareness.

This paper makes three marginal contributions: Firstly, starting from the higher requirements of China's green and low-carbon transformation for corporate social responsibility, it achieves a more comprehensive and refined evaluation of CSR reputation for Chinese listed companies in terms of innovation, coordination, sustainability, openness, and sharing. Secondly, this paper discusses the influential factors of CSR reputation in the new era from the perspectives of external supervision and internal governance, with an emphasis on the impact of public environmental concerns. Thirdly, this paper further reveals and tests the transmission mechanism of the above factors on corporate social responsibility, providing theoretical guidance for enterprises to improve their social responsibility image and achieve high-quality development under the goal of a green and low-carbon transition.

2. Hypothesis Development

2.1. Factors Influencing CSR Reputation

2.1.1. Public Environmental Concern

From an external regulation perspective, with the continuous development of network technology and the increasing degree of informatization, the channels through which the public accesses corporate information have increased. Moreover, due to the popularization of environmental protection and green transformation concepts, the public's attention to the environment has increased, and there are higher expectations for CSR reputation. Faced with public environmental concerns and public opinion pressure, the extent to which enterprises affect the environment in their production and operation processes will determine consumers' perceptions of the enterprises. Therefore, companies tend to adopt more proactive social responsibility behaviors to maintain their CSR reputation, establish an environmentally friendly corporate image [18], and earn customer trust. At the same time, public environmental concerns have promoted the transparency of CSR and the establishment of supervision mechanisms. Faced with public attention, companies are forced to disclose their social responsibility performance more transparently, alleviating information asymmetry [19].

The continued public supervision of CSR has also prompted companies to be more careful in fulfilling their social responsibilities to avoid negative incidents that may damage corporate reputations. In addition, the impact of public environmental concerns on CSR reputation is also reflected in market competition. Those enterprises that actively fulfill social responsibilities tend to gain public recognition and praise, thus standing out in the market competition. On the contrary, companies that are irresponsible in social responsibility may face public resistance and condemnation, which will affect their market competitiveness. In short, the public environmental concern for CSR reputation not only promotes the improvement of CSR but also enhances the transparency of social responsibility and the fairness of market competition. Thus, we propose H1.

Hypothesis 1 (H1). *Public environmental concern can drive the enhancement of CSR reputation.*

2.1.2. Enterprise Scale

From an internal governance perspective, previous research has often claimed that larger companies are more capable of fulfilling CSR but has not found significant differences in proximity and communication [11,20]. Due to limited human resources and financial capital, smaller companies lack economies of scale and experience relatively less public pressure to fulfill social responsibilities [21]; thus, they are not motivated to prioritize social responsibility. Formally disclosing CSR to the public through guidelines or standards can be costly. Generally, small-scale entrepreneurs who manage companies are primarily under pressure from investors seeking maximum returns, leading to relatively limited resources allocated to socially responsible practices. In contrast, large companies, driven by societal expectations and pressures, can extend their CSR efforts to subsidiaries in different regions

and to first-line, second-line, and third-line cooperative suppliers [22]. At the same time, formulating and executing a social responsibility strategy in sizable enterprises are usually supervised by the CSR department, with other functional departments such as legal, public relations, and marketing increasingly involved in these initiatives [2]. One advantage is that the benefits of CSR reputation can be applied to various brands and products within the corporation [20]. Large enterprises or well-known companies often have higher social visibility, and public expectations are correspondingly higher than for ordinary companies. This tendency results in elevated demands for their social responsibility efforts.

From the perspective of enterprise internal cost, research has found that CSR organizational costs tend to increase as the company size decreases. This provides financial incentives for larger enterprises to focus on CSR while avoiding the relatively expensive initiation of CSR for smaller companies. Smaller companies tend to benefit less from CSR, with costs being higher than total benefits [23]. For large-scale enterprises, formulating and publishing reports on social responsibility typically incur relatively low costs compared to their overall operations. However, this undertaking represents a relatively significant expense for small enterprises compared with their core business [23]. For example, a relationship exists between investment and returns in a U-shaped curve concerning community issues or environmental performance. Due to their substantial resources, large-scale companies can generate significant positive impacts with increasing investments. In contrast, for small-scale companies, excessive costs can impede the development of core business operations, while a minimal investment may not significantly enhance marketing and societal environmental issues. These situations arise from the varying scales of companies, influencing the emphasis on investment and the outcomes of social responsibility performance. Thus, we propose H2.

Hypothesis 2 (H2). *Expanding the enterprise scale may enhance CSR reputation.*

2.1.3. Female Participation in Management

With the increasing proportion of female executives in publicly traded companies across various industries, many scholars have shifted their focus to women in corporate governance research. Regarding the impact of female executives on CSR, some research findings suggest that companies with female executives perform better in areas such as charitable donations [24]. Other studies have found that female executives lack the professional knowledge to improve enterprise innovation because they are more cautious about taking strategic risks, which suppresses innovation activities and restricts the expenditure of CSR [25]. When gender inequality is low, female directors facilitate fulfilling CSR. However, in environments with high gender inequality, their impact becomes negative [26]. The existing literature has found that female executives have a suppressive effect on CSR: in closed social cultures, due to significant gender perception and bias, females may face barriers to promotion and demonstrating their capabilities, leading to limited influence on the fulfillment of CSR [27]. Moreover, bias against female executives can make it challenging for them to earn respect and recognition from subordinates [28], restricting their management activities. In the fierce competition for senior management positions, female executives, in their pursuit of reputational capital in competitive environments, prioritize maintaining the company's reputation, thereby improving the reliability of financial disclosure and reducing corporate misconduct [29]. However, this intense focus on suppressing misconduct may lead to a decline in the company's motivation to fulfill social responsibilities, as maintaining reputation becomes the primary concern. This has a diminishing effect on female executives supporting CSR, as depicted in Figure 1. Based on these observations, we propose H3.

Hypothesis 3 (H3). *Female participation in management suppresses CSR reputation.*

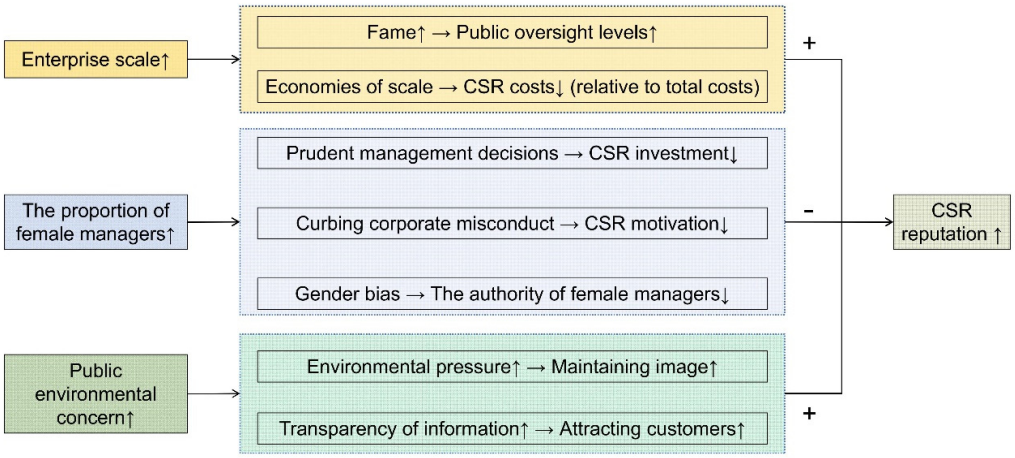

Figure 1. Impact factors of corporate social responsibility reputation. Note: → represents a driving force. ↑ and ↓ respectively indicate an increase and a decrease in level, + and − respectively denote a positive effect and an inhibitory effect.

2.2. The Driving Mechanism of Public Environmental Concern to CSR Reputation

2.2.1. Green Technology Innovation (GRP)

As environmental issues receive increasing attention, the public has higher expectations for enterprises to fulfill their environmental and social responsibilities. Against this backdrop, green innovation has emerged as a crucial pathway for enhancing CSR reputation. Heightened public concern for the environment incentivizes enterprises to engage in green innovation activities. Faced with public concerns regarding environmental pollution and resource wastage, companies recognize the potential negative impacts of traditional production modes and are seeking greener and more sustainable production approaches. This environmental pressure encourages enterprises to optimize their production processes [30] and intensify research and the application of green technologies and environmentally friendly processes [31], thus driving the implementation of green innovations. By introducing eco-friendly technologies and production methods, enterprises can reduce environmental pollution and resource consumption and decrease carbon and waste emissions during production processes, which ultimately contributes to improving environmental quality and addressing social environmental issues [32]. At the same time, it enhances the enterprises' reputation for social responsibility. Furthermore, the successful practice of green innovation has brought economic benefits to enterprises, which, in turn, supports the company's pursuit of a reputation for social responsibility. In general, green innovation not only helps companies reduce energy consumption and production costs but also helps them open new markets and increase the value of their products. The realization of these economic benefits provides strong financial support for enterprises to enhance the image of social responsibility. Thus, we propose H4.

Hypothesis 4 (H4). *Public environmental concern enhances CSR reputation by promoting green technology innovation.*

2.2.2. Executive Environmental Awareness (EBR)

As global environmental issues become increasingly prominent, corporate green transformation emerges as a crucial driver for environmental protection and high-quality economic development. Consequently, there is growing public attention to corporate environmental behaviors and their environmental impacts. Senior executives, as decision-makers and leaders within enterprises [33], play a pivotal role in enhancing corporate environmental consciousness and practicing corporate social responsibility.

With environmental issues highlighted and public environmental awareness heightened, corporate senior executives have gradually recognized the critical role of environmental protection and low-carbon transformation in sustainable enterprise development. Senior executives have begun to realize that actively fulfilling corporate environmental responsibilities not only contributes to environmental protection but also garners customer goodwill and support [34]. This awakening environmental consciousness prompts senior executives to place greater emphasis on ecological environmental protection issues in corporate strategic formulation and decision-making. As decision-makers and implementers within enterprises, the enhancement of their environmental awareness directly influences corporate environmental behaviors. Specifically, enterprises can implement stricter environmental production standards internally, drive technological innovation and production transformation, enhance corporate green competitive advantages and CSR reputation, and establish a positive corporate image [35]. Additionally, the enhancement of senior executives' environmental awareness has a positive impact on corporate organizational culture and employee behavior. The environmental awareness of senior executives often serves as an example of leadership in shaping corporate organizational culture. They may advocate for and support employee participation in environmental activities, fostering employees' environmental awareness and sense of responsibility. This cultural shift produces environmental behavior consensus and habits within the enterprise, thereby promoting corporate performance in social responsibility and enhancing its reputation and image.

The pathways through which public environmental concern drives the enhancement of senior executives' environmental awareness primarily include stimulating the awakening of senior executives' environmental consciousness, promoting corporate environmental investment and actions, influencing corporate organizational culture and employee behavior, and ultimately enhancing CSR reputation to achieve sustainable development goals, as shown in Figure 2. Thus, we propose H5.

Hypothesis 5 (H5). *Public environmental concern enhances CSR reputation by improving executive environmental awareness.*

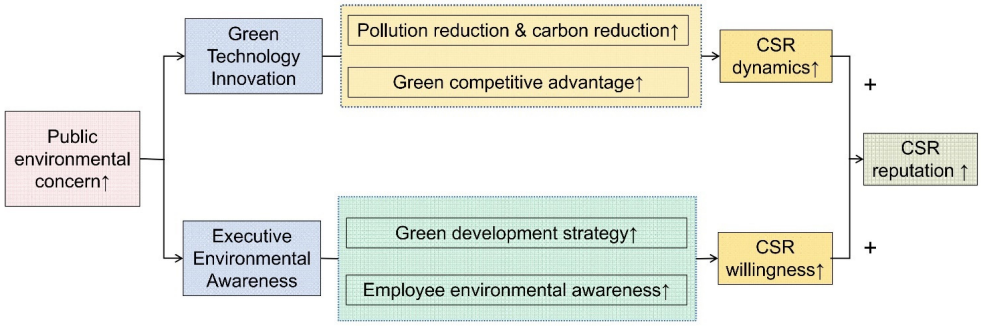

Figure 2. Driving mechanism of corporate social responsibility reputation. Note: → represents a driving force. ↑ indicates an increase in level, + denotes a positive effect.

3. Research Design

3.1. Model Specification

We combed the literature and built models (1)–(3) to test the impact of public environmental concern, enterprise scale, and the participation of females in management on CSR reputation as follows:

$$z\_score_{it} = \alpha_0 + \alpha_1 ENC_{it} + \alpha_2 Control_{it} + \varepsilon_i + \theta_t + \mu_{it}, \quad (1)$$

$$z\_score_{it} = \alpha_0 + \alpha_1 Scale_{it} + \alpha_2 Control_{it} + \varepsilon_i + \theta_t + \mu_{it}, \quad (2)$$

$$z\_score_{it} = \alpha_0 + \alpha_1 FER_{it} + \alpha_2 Control_{it} + \varepsilon_i + \theta_t + \mu_{it}, \quad (3)$$

where the variable subscripts i and t represent firm i in year t, z_score_{it} represents CSR reputation, ENC_{it} represents public environmental concern, $Scale_{it}$ represents enterprise scale, FER_{it} represents female participation in management, $Control_{it}$ represents control variables, ε_i and θ_t represent individual-fixed effects and time-fixed effects, respectively, and μ_{it} is a random perturbation term.

3.2. Variable Declaration

3.2.1. The Dependent Variable: CSR Reputation (z_score)

In the context of green and low-carbon transformation, the scope of corporate social responsibility continues to expand and is not only limited to economic responsibility, charity responsibility, and moral responsibility but also includes environmental responsibility and legal responsibility. Based on this, it is necessary to accurately evaluate the reputation of corporate social responsibility from a more comprehensive dimension. This will not only help us grasp the status quo and development trend of CSR reputation and guide enterprises to fulfill their social responsibilities but also, more importantly, it can help China's economic green transformation and high-quality development and ultimately build an environmentally friendly economic system [36]. Based on General Secretary Xi Jinping's discourse on CSR, we constructed a high-quality evaluation index system for CSR reputation from five dimensions: innovation, coordination, sustainability, openness, and sharing. The entropy method was employed to analyze this index, providing a more comprehensive assessment of a company's reputation for social responsibility. The index system consists of five primary indicators and 15 secondary indicators. The final analysis results were obtained by considering the overall weights of these indicators. The specific dimensions and selected indicators are as follows.

The first aspect is innovation, manifested in a company's investment in research and development of new products and technologies, enhancing its innovation capability and contributing to social responsibility. Improving innovation capability and technological innovation drive companies' willingness to undertake social responsibility. In this regard, the analysis was conducted using the company's assumption of social responsibility to influence its reputation level. The Guidelines categorize corporate innovation capability into the R&D and transformation stages. We measured the innovation capability in the R&D stage using the ratio of R&D investment to capital expenditure and represented the innovation capability in the transformation stage using the number of patent applications and granted patents [37].

The second aspect is the enterprise's coordination contribution, which is manifested in the harmonious development of the company's operation and social activities. Internal coordination mechanisms within the enterprise primarily include supply chain and cash flow coordination. Supply chain management optimizes resource allocation, enhancing a company's competitiveness, leading to increased profits and more robust market positioning [38]. Cash flow refers to the inflow and outflow of monetary funds over a specific period. Effective cash flow management allows companies to control funds, improve capital utilization efficiency, allocate resources rationally, reduce capital costs, and enhance profit levels. We used inventory turnover, operating cash flow [39], and the ratio of management expenses to represent these aspects.

The third aspect is a corporate sustainability contribution, which refers to the extent to which a company contributes to resource utilization, environmental governance, and long-term development while seeking to maximize its economic interests. Financial indicators, such as return on assets and the earnings retention rate, directly reflect a company's level of sustainable development. In the traditional financial metrics system, a company's sustainable development depends on its profitability and impact on the environment, society, and corporate governance (ESG). Especially in the context of low-carbon transformation, the impact of enterprises on the environment during their operations has attracted more and more attention from all walks of life. The ESG rating evaluates a company's sustainability and its impact on society from the perspective of ESG [40]. Thus, we utilized return on

assets, the retention rate of earnings, and the ESG evaluation index to measure a company's contribution to sustainable development in social responsibility reputation assessment.

The fourth aspect is corporate openness contribution. Through external openness and by attracting foreign investment, including introducing advanced foreign technology and expertise, companies enhance the openness of capital markets, increase competitiveness in product markets, accelerate marketization, and achieve mutual development for both the company and society. The specific indicators we used include the proportion of overseas income, foreign investment, and the ratio of foreign capital.

The fifth aspect is corporate shared contribution, which refers to a company's contribution through sharing its business achievements to foster the common development of various stakeholders. Regarding social responsibility, companies consider sharing as the starting point and foundation for development, continually deepening technological advancements and enhancing cost efficiency. Specifically, corporate contributions can be categorized into those made to shareholders, employees, and society. We used basic earnings per share, the ratio of employee wages to operating income [41], and the tax contribution rate as measures.

Based on the analysis in the preceding sections, we considered the indicators' importance, relevance, data availability, and weight determination methods and used the entropy method to assign weights to each indicator. The entropy method is a multi-criteria decision-making approach based on information entropy. Compared with hierarchical analysis, factor analysis, and other subjective assignment methods, this method can reduce the deviation caused by subjective assignment and has higher precision and stronger objectivity. Specifically, the entropy method determines the weights of indicators based on their information content and dispersion. If the degree of dispersion of an indicator is greater, it means that the indicator provides more information, and the greater the role of the indicator in the comprehensive evaluation, the greater its weight. Otherwise, the weight is smaller. Subsequently, the weighted sum method was used to measure Chinese enterprises' Corporate Social Responsibility Reputation Index. The study involved processing data for 666 companies nationwide from 2013 to 2021 across five dimensions and 15 indicators. It calculated the weights of the relevant indicators for China's Corporate Social Responsibility Reputation Index and the comprehensive reputation evaluation scores. Table 1 presents the weights of the 15 common factors obtained through the entropy method processed using STATA 17.0 software.

As shown in Table 1, the weights of the primary indicators, namely innovation, coordination, and sharing, are relatively substantial, accounting for 0.1964, 0.4501, and 0.2772, respectively. These three indicators collectively account for an impact of over 70% on the Corporate Social Responsibility Reputation Index, indicating their significant influence on CSR reputation. Furthermore, these weights reflect different aspects of corporate reputation, such as technological innovation, coordinated development, and societal contributions. Within the innovation category, the indicators with the highest weights are the number of patent applications and the proportion of research and development expenditure. In the coordination category, the inventory turnover rate has the highest weight, while in the contribution-sharing category, the proportion of wages paid to employees holds the highest weight. To provide a more intuitive observation of the secondary indicators of CSR reputation, Table 2 presents the descriptive statistics of standardized indicators. Among them, the coefficient of variation (C.V.) reflects the dispersion degree of each index after eliminating the measurement dimension. From the magnitude of the coefficient of variation, ROA, ESG rating, and income retention (RE), the three secondary indicators of the primary indicator, "sustainability", have a small coefficient of variation and low dispersion of the indicators. As a result, they contribute less information to the overall score and have a relatively low weight relative to other primary indicators.

Table 1. Evaluation index system and weight of CSR reputation.

	Primary Indicators	Primary Indicators Weight	Secondary Indicators	Variable	Secondary Indicators Weight
CSR Reputation	Innovations	0.1963	Patent applications	PAF	0.0986
			R&D/Operating expenses	GERD	0.0975
			Patents authorized	PAGT	0.0002
	Coordination	0.4501	Inventory turnover ratio	ITO	0.2938
			Net cash flow from operating activities	CFO	0.0003
			Management expenses/Operating expenses	GA	0.1560
	Sustainability	0.0020	Return on assets	ROA	0.0001
			ESG score	ESG	0.0019
			Income retention rate	RE	0.0000
	Openness	0.0744	Foreign revenue /Business income	FEI	0.0000
			Investment abroad	ODI	0.0268
			Foreign capital/Paid-in capital	FOWN	0.0476
	Sharing	0.2772	Per-share earnings	EPS	0.0001
			Staff wage/Business income	PAP	0.2771
			Tax rate/business income	TAX	0.0000

Table 2. Descriptive statistics of CSR reputation secondary indicators.

Variables	N	Mean	Std.	Min	Max	C.V.
PAF	5994	0.007	0.039	0	1	5.171
GERD	5994	0.008	0.039	0	1	4.920
PAGT	5994	0.092	0.014	0	1	0.152
ITO	5994	0.001	0.019	0	1	30.501
CFO	5994	0.297	0.035	0	1	0.117
GA	5994	0.001	0.014	0	1	24.298
ROA	5994	0.692	0.033	0	1	0.047
ESG	5994	0.645	0.170	0	1	0.264
RE	5994	0.860	0.024	0	1	0.028
FEI	5994	0.851	0.012	0	1	0.015
ODI	5994	0.002	0.013	0	1	7.653
FOWN	5994	0.048	0.093	0	1	1.930
EPS	5994	0.684	0.030	0	1	0.044
PAP	5994	0.000	0.013	0	1	45.720
TAX	5994	0.300	0.012	0	1	0.041

Note: Descriptive statistics were obtained after the standardization of each indicator. N, Mean, Std, Min, Max, and C.V., respectively, represent the number of observations, mean value, standard deviation, minimum value, maximum value, and coefficient of variation of each indicator.

To be clear, sustainability had a weight of just 0.0020, which does not mean this metric is not important at all. On the one hand, the sustainable development of enterprises is a slow and continuous process that requires the accumulation of comprehensive resources and long-term efforts of enterprises. Therefore, when measuring the sustainability index, it is difficult for the sustainability index level of enterprises to change significantly within only a few years of the research period, and the dispersion of the data is very small (see the C.V. in Table 2), so the weight determined by the entropy method is very small. On the other hand, sustainability, as one key factor for the long-term success of enterprises, plays an important guiding role in the strategic decision-making of enterprises. Companies with high ESG performance usually have a more positive corporate image, which can reduce downside risks [42]. Therefore, in assessing CSR reputation, incorporating sustainability as a metric enables a more comprehensive evaluation of the company's overall performance. All in all, while sustainability may have a relatively low weight, its importance should

not be overlooked. In the decision-making process, enterprises comprehensively consider various dimensions and make trade-offs according to specific circumstances to ensure sustainable development in economic, social, and environmental aspects.

3.2.2. The Independent Variables

Public environmental concern (*ENC*): In reference to existing literature research [43], Python 3.10.0 software was employed to crawl the daily average search volumes on the Baidu search engine from 2013 to 2021 for the terms "environmental pollution" and "smog" in various prefecture-level cities. These search volumes were summed up and divided by 1000 to obtain the final variable for the standardization of dimensions. Enterprise scale (*Scale*): We used the total assets of the enterprise at the end of the year to represent the enterprise scale [44] and take the natural logarithm to eliminate the scale effect. Female participation in management (*FER*): We used the proportion of female managers of all managers to represent the participation of females in management [45].

3.2.3. Mechanism Variables

Green Technology Innovation (*GRP*): We selected the number of green patents applied for by companies to measure the level of corporate green technology innovation [46]. Executive Environmental Awareness (*EBR*): Using the text analysis method, we selected 19 keywords that are highly relevant to "environmental protection" and the environmental awareness of executives according to their frequency in the annual report of listed companies from 2013 to 2021 [47]. The 19 keywords are energy conservation and emissions reduction, environmental protection strategy, environmental philosophy, environmental management organization, environmental education, environmental training, environmental technology development, environmental audit, energy conservation and environmental protection, environmental policy, environmental department, environmental inspection, environmental work, environmental governance, low-carbon environmental protection, environmental facilities, environmental and environmental governance, environmental laws and regulations, and environmental pollution control.

3.2.4. Control Variables

According to the combing of the relevant literature, we selected seven control variables at the enterprise level to control the endogenous problem caused by missing variables. Definitions and descriptions of the major variables are presented in Table 3.

Table 3. Variable definitions.

Variable Types	Variables	Variable Symbols	Definitions
Dependent variables	CSR Reputation	*z_score*	The CSR reputation evaluation index system is constructed from the five dimensions of innovation, coordination, sustainability, openness, and sharing
Independent variables	Public environmental concern	*ENC*	Search volume of terms
	Enterprise scale	*Scale*	The natural logarithm of the total assets
	Female participation	*FER*	Female managers/Total managers
Mechanism variables	Green technology innovation	*GRP*	Green patents applied
	Executive environmental awareness	*EBR*	Text analysis
Control variables	Enterprise age	*Age*	Enterprise establishment years
	Asset–liability ratio	*Lev*	Total liabilities/Total assets
	Cash holding level	*Cash*	Monetary capital/Total assets
	Government subsidy	*Gov*	Government subsidy/Operating income
	Equity concentration	*First*	The largest shareholder shareholding ratio
	Employee intensity	*Staff*	The number of employees/Operating income
	Network center degree of independent directors	*Net*	The position of senior executives in other enterprises

3.3. Data Source and Description

Based on data availability, the sample of this paper was made up of Chinese listed companies. To ensure data integrity, companies with serious missing indicators were excluded. Ultimately, 666 companies were selected as the study sample. From 2013 to 2021, the characteristics of the 666 companies were as follows: (1) In terms of ownership, private enterprises accounted for 61%, state-owned enterprises accounted for 30%, and other types of enterprises accounted for 9%. (2) In terms of registered location, the top seven provinces and their proportions were Guangdong Province 18%, Zhejiang Province 15%, Jiangsu Province 11%, Shandong Province 9%, Beijing 8%, Shanghai 6%, and Fujian Province 4%. (3) In terms of industry characteristics, the top seven industries were the following: computer, communication, and other electronic equipment manufacturing; electrical machinery and equipment manufacturing; special equipment manufacturing; chemical raw materials and chemical product manufacturing; pharmaceutical manufacturing; general equipment manufacturing; and automobile manufacturing. The first four industries accounted for 15%, 10%, 9%, and 8%, respectively, and the latter three all accounted for 6%. The above characteristics are basically consistent with the characteristics of all Chinese listed companies, indicating that using this sample for research was representative.

The data on public environmental concern (ENC) were obtained through web scraping using Python software, while the remaining variables were sourced from the CSMAR database. CSMAR, short for China Stock Market and Accounting Research Database, is a comprehensive research-oriented database focusing on China's finance and economy. The database covers multiple series, such as listed companies, stock market, fund market, bond market, derivative products, economic research, overseas research, and special topics, and each series contains the corresponding variables. The official website of the CSMAR database is https://www.csmar.com/en/index.html, accessed on 6 June 2023. In addition, CSMAR databases are available on the Wharton Research Data Services Platform, Princeton University, Harvard University, and Morgan Stanley for overseas researchers. Few missing values were complemented by linear interpolation, and the missing observations were concentrated on five variables: GERD, GA, RE, PAP, and TAX, which are the secondary indicators of CSR reputation. We first found the law of available data sequence (which can also be understood as a series of discrete points in a coordinate); then, the missing values were estimated according to the distribution characteristics of two data points near the left and right of the interpolation points. These missing values only accounted for 3% of the corresponding five indicators, so they did not have a substantial impact on the measurement of CRS (Table 4).

Table 4. Descriptive statistics of variables.

Variable Types	Variables	N	Mean	Std.	Min	Max
Dependent variable	*z_score* (weighted score)	5994	0.02	0.04	0.00	1.00
Independent variables	*ENC* (thousand times)	5994	0.25	0.25	0.00	1.27
	Scale (RMB)	5994	22.61	1.31	19.53	28.50
	FER (%)	5994	18.37	10.48	0.00	62.50
Control variables	*Age* (year)	5994	18.03	5.63	4.00	54.00
	Lev (%)	5994	0.43	0.20	0.01	3.65
	Cash (RMB)	5994	0.17	0.11	0.00	0.87
	Gov (%)	5994	0.02	0.35	−0.02	16.47
	First (%)	5994	28.96	38.40	0.00	100.00
	Staff (person/RMB)	5994	2.74	67.94	0.06	4657.38
	Net (person)	5994	0.43	0.37	0.00	3.00
Secondary indicators of CSR reputation	PAF(piece)	5994	75.97	392.82	0.00	10,142.00
	GERD(%)	5994	0.11	1.74	−11.39	113.14
	PAGT(piece)	5994	64.80	318.82	0.00	8198.00
	ITO(%)	5994	85.12	2595.70	0.02	13,8040.70
	CFO(RMB)	5994	1.23×10^9	5.23×10^9	-4.35×10^{10}	1.07×10^{11}
	GA (%)	5994	0.55	13.29	0.00	962.97
	ROA(%)	5994	0.04	0.10	−2.09	1.00
	ESG(rating)	5994	6.51	1.19	2.00	9.00
	RE(%)	5994	0.66	0.77	−26.47	5.07
	FEI(%)	5994	0.13	3.06	−210.61	37.10
	ODI(RMB)	5994	5.03×10^9	3.09×10^{11}	-3.54×10^{10}	2.40×10^{13}
	FOWN(%)	5994	4.33	8.25	0.05	88.55
	EPS(RMB)	5994	0.33	0.73	−16.46	8.09
	PAP(%)	5994	0.19	9.83	−0.02	741.41
	TAX(%)	5994	0.02	0.61	−15.05	35.17

Note: N, Mean, Std., Min, and Max represent the observed number, mean value, standard deviation, minimum value, and maximum value of the variables, respectively.

4. Empirical Results

4.1. Baseline Results

Incorporating the theoretical analysis previously discussed, we utilized fixed-effects regression for empirical testing. Based on the regression results of the baseline model in Table 5, columns (1) to (3), the regression coefficients for public environmental concern (ENC), enterprise scale (Scale), and female participation in management (FER) are all significant. Specifically, column (1) presents the estimation results for the public environmental concern (ENC) variable, with a coefficient of 0.0118, which was significantly positive at the 1% level. This indicates a positive correlation between public environmental concern and the level of CSR reputation, suggesting that public environmental concern contributes to the fulfillment of CSR; thus, hypothesis H1 is validated. Column (2) shows the estimation results for enterprise scale (Scale), with a regression coefficient of 0.0013, which was significantly positive at the 10% level. This indicates a positive correlation between enterprise scale and the level of CSR reputation, suggesting that the expansion of enterprise scale contributes to the fulfillment of CSR; thus, hypothesis H2 is validated. Column (3) presents the estimation results for the female participation in management (FER) variable, with a regression coefficient of 0.0002, which was negatively significant at the 1% level, indicating that an increase in the proportion of female managers within the enterprise's management inhibits the improvement of CSR reputation; thus, hypothesis H3 is confirmed.

Table 5. Baseline results.

Variables	(1)	(2)	(3)
	z_score	z_score	z_score
ENC	0.0118 ***		
	(0.0031)		
Scale		0.0013 *	
		(0.0007)	
FER			−0.0002 ***
			(0.0001)
Age	−0.0003 **	−0.0006 ***	−0.0004 ***
	(0.0001)	(0.0002)	(0.0001)
Lev	−0.0027	−0.0033	−0.0022
	(0.0026)	(0.0026)	(0.0026)
Cash	−0.0042	−0.0040	−0.0037
	(0.0036)	(0.0036)	(0.0036)
Gov	−0.0041 ***	−0.0041 ***	−0.0041 ***
	(0.0011)	(0.0011)	(0.0011)
First	9.76×10^{-6}	1.00×10^{-5}	9.56×10^{-6}
	(7.09×10^{-6})	(7.10×10^{-6})	(7.09×10^{-6})
Staff	0.0002 ***	0.0002 ***	0.0002 ***
	(6.01×10^{-6})	(6.02×10^{-6})	(6.01×10^{-6})
Net	0.0011	0.0010	0.0012
	(0.0010)	(0.0010)	(0.0010)
Constant	0.0208 ***	−0.0008	0.0273 ***
	(0.0031)	(0.0149)	(0.0029)
Individual-fixed	YES	YES	YES
Time-fixed	YES	YES	YES
Observations	5994	5994	5994
R-squared	0.2860	0.2840	0.2860

Note: z_score represents the CSR reputation score. ENC, Scale, and FER, respectively, represent the independent variables of public environmental concern, enterprise scale, and female participation. Age, Lev, Cash, Gov, First, Staff, and Net are control variables. Individual-fixed and time-fixed control for unobservable heterogeneity at the listed company and time level. R-squared is the coefficient of determination. Robust standard errors are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

4.2. Heterogeneity Analysis

Based on the perspective of external supervision, we examined the differences in the impact on CSR reputation based on public environmental concerns focusing on two aspects: the nature of corporate equity and the geographical location of the enterprise.

4.2.1. Different Equity Nature

The type of corporate ownership can significantly impact a business's social responsibilities. Compared with non-state-owned enterprises, state-owned enterprises often have more substantial government financial support, invest more in environmental protection, and bear more social responsibilities. We referenced the distinction in equity nature among listed companies between state-owned and non-state-owned enterprises [48], constructed dummy variables for state-owned enterprises (SOE) and non-state-owned enterprises (ISOE), and through the interaction term ENC × SOE, ENC × ISOE [49], examined the differences in the impact of public environmental concern on CSR reputation across businesses of different ownership types.

The differential impact of public environmental concern on CSR reputation due to different equity natures is shown in Table 6, columns (1) to (2). The regression coefficient of the interaction term ENC×ISOE was 0.0183, which was significant at the 1% level, indicating that the impact of public environmental concern on the CSR reputation of non-state-owned enterprises is more pronounced, while its effect on SOEs is not as evident. This may be because, compared with non-SOEs, SOEs bear special duties and missions. In addition to achieving economic goals like performance growth, SOE managers also need to undertake certain social responsibilities on behalf of the government, leading to a higher level of CSR awareness. Thus, the influence of public environmental concerns on CSR reputation of SOEs is weakened, whereas it has a greater impact on the CSR

reputation of non-SOEs. For non-SOEs, proactively undertaking social responsibilities is key to enhancing corporate credibility. Non-SOEs can significantly benefit from actively assuming social responsibilities, creating a good reputation, expanding their influence, reducing information asymmetry, alleviating agency problems, and continuously meeting the public's expectations.

Table 6. Heterogeneity analysis.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	SOE	ISOE	East	Mid	West	Northeast
	z_score	z_score	z_score	z_score	z_score	z_score
ENC × SOE	−0.0044					
	(0.0038)					
ENC × ISOE		0.0183 ***				
		(0.0035)				
ENC × East			0.0138 ***			
			(0.0031)			
ENC × Mid				−0.0205 *		
				(0.0119)		
ENC × West					−0.0123	
					(0.0132)	
ENC × Northeast						−0.0356
						(0.0372)
Constant	0.0260 ***	0.0203 ***	0.0207 ***	0.0261 ***	0.0257 ***	0.0257 ***
	(0.0029)	(0.0030)	(0.0030)	(0.0029)	(0.0029)	(0.0029)
Control variables	YES	YES	YES	YES	YES	YES
Observations	5994	5994	5994	5994	5994	5994
R-squared	0.2840	0.2880	0.2870	0.2840	0.2840	0.2840

Note: z_score represents the CSR reputation score. ENC × SOE and ENC × ISOE represent the interaction terms between public environmental concern and corporate ownership nature. ENC × East, ENC × Mid, ENC × West, and ENC × Northeast represent the interaction terms between public environmental concern and the location of the enterprise. The control variables are the same as in Table 4. Robust standard errors are reported in parentheses. *** $p < 0.01$, * $p < 0.1$.

4.2.2. Location of the Enterprise

Due to China's vast territory, there are disparities in resource endowment, social responsibility awareness, media supervision level, and policy enforcement strength across different regions of our country, which, in turn, evolve into regional development gaps. Based on the geographic location of the companies' cities, we divided the company samples into four groups for heterogeneity analysis: eastern, central, western, and northeastern regions. According to the geographic location of the companies' cities, regional dummy variables were constructed: East, Mid, West, and Northeast. Through the interaction terms ENC × East, ENC × Mid, ENC × West, and ENC × Northeast, we examined the differences in the impact of public environmental concern on CSR reputation among companies in different regions [49].

Table 6, columns (3) to (6), presents the differential impact of public environmental concern on CSR reputation due to the heterogeneity of regional development conditions. In the group of companies located in the East region, the regression coefficient of the public environmental concern variable was significant at 0.0138, and it was significant at the 1% level. This indicates that the impact of public environmental concern on CSR reputation is very significant in the east region but not in the central, western, and northeastern regions. A possible reason is that the eastern region has a higher level of economic development and industrial concentration. Furthermore, enterprises in the eastern region are usually larger in scale, and people pay more attention to their social responsibility behaviors, with stricter public opinion supervision. Therefore, with a stronger public environmental focus, eastern enterprises pay more attention to social responsibility to avoid reputation and economic losses.

4.3. Control of Endogeneity

To avoid endogeneity issues caused by omitted variables in the baseline regression results, we preprocessed public environmental concern (ENC), enterprise scale (Scale), and female participation in management (FER) by one period in advance, constructing the instrumental variables ENC_1, Scale_1, and FER_1, respectively, to verify the reliability of the results. As shown in Table 7, the results remain significant. Column (1) shows the regression results of the public environmental concern advanced by one period on CSR reputation, indicating that the effect of public environmental concern in the advanced period still has a significantly positive impact on improving CSR reputation, with a coefficient of 0.0053, passing the 1% significance test. Column (2) shows the regression results of enterprise scale advanced by one period on CSR reputation, indicating that the effect of expanding enterprise scale in the advanced period still has a significantly positive impact on improving CSR reputation, with a coefficient of 0.0051, passing the 1% significance test. Column (3) shows the regression results of female management participation advanced by one period on CSR reputation, indicating that it still inhibits the improvement of CSR reputation level during the advanced period, with a coefficient of −0.0001, passing the 1% significance test. These conclusions further support hypotheses H1–H3.

Table 7. Control of endogeneity.

Variables	**(1)**	**(2)**	**(3)**
	z_score	**z_score**	**z_score**
ENC_1	0.0053 ***		
	(0.0019)		
Scale_1		0.0051 ***	
		(0.0004)	
FER_1			−0.0001 ***
			(0.00004)
Constant	0.0263 **	−0.1070 ***	0.0295 **
	(0.0130)	(0.0083)	(0.0131)
Control variables	YES	YES	YES
Observations	5993	5993	5993
R-squared	0.7550	0.1920	0.7550

Note: The explained variables are the CSR reputation score. ENC_1, Scale_1, and FER_1, respectively, represent the public environmental concern, enterprise scale, and female participation one period ahead. The endogenous results show that public environmental concern and enterprise scale still have a significant positive impact on the improvement of CSR reputation, but female management participation has an inhibitory effect. The control variables are the same as in Table 4. *** $p < 0.01$, ** $p < 0.05$.

4.4. Robustness Test

4.4.1. Trimming the Tail by 1%

To further support the research on the impact of public environmental concern (ENC), enterprise scale (Scale), and female participation in management (FER) on CSR reputation (z_score) and to ensure the robustness of the conclusions for hypotheses H1, H2, and H3, we uniformly applied truncation to the dependent variable, independent variables, and control variables. This was performed to further demonstrate the significant effects of public environmental concern (ENC), enterprise scale (Scale), and female participation in management (FER) on CSR reputation (z_score). Specifically, all variables involved in this study, except for the operational years of the enterprise, undergo a 1% truncation process. Subsequently, regression tests were conducted, and the results are presented in columns (1) to (3) of Table 8. The conclusions align with the baseline regression results.

Table 8. Robustness check.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	z_score	z_score	z_score	CSR	CSR	CSR
ENC	0.0047 ***			1.8930 **		
	(0.0018)			(0.8080)		
Scale		0.0012 ***			4.8850 ***	
		(0.0004)			(0.1730)	
FER			−0.00004 *			−0.1100 ***
			(0.00003)			(0.0194)
Constant	0.0216 ***	−0.0044	0.0096 ***	28.1300 ***	−72.0000 ***	30.8800 ***
	(0.0083)	(0.0123)	(0.0014)	(1.0350)	(3.6910)	(1.0920)
Control variable	YES	YES	YES	YES	YES	YES
Observations	5994	5994	5994	5380	5380	5380
R-squared	0.0270	0.0270	0.0090	0.1330	0.2440	0.1380

Note: Columns (1) to (3) are the regression results after trimming the tail by 1% for all variables except operational years. The explained variable in columns (4) to (6) is CSR rating. The results indicate that public environmental concern and enterprise scale enhance corporate social responsibility, but female management participation is counterproductive. The control variables are the same as in Table 4. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

4.4.2. Replacing the Dependent Variable

In the baseline regression, we substituted CSR rating (CSR) (Ho et al., 2022 [50]) for CSR reputation (z_score). The regression results with the replaced dependent variable are presented in columns (4) to (6) of Table 8. The results align with the baseline regression outcomes.

5. Additional Analyses—Mechanism Test

Based on the above assumptions, we employed a fixed-effects model, using green technology innovation and executive environmental awareness as mechanism variables. It investigated the impact of public environmental concern on CSR reputation through green technology innovation and executive environmental awareness.

Table 9 presents the results of the mechanism examination. Column (1) represents the test results for Formula (1), indicating the impact of public environmental concern on CSR reputation. The results in column (1) show that the regression coefficient for public environmental concern was 0.0118, passing the 1% significance test. This suggests that as public environmental concern increases, CSR reputation improves. This reconfirms hypothesis H1, that public environmental concern significantly improves CSR reputation.

Columns (2) to (3) in Table 9 represent the test results of how public environmental concern influences CSR reputation through green technology innovation. The results in column (2) show that public environmental concern contributes to an increase in green technology innovation. For every 1% increase in public environmental concern, there was a corresponding attraction of 4.294% in green technology innovation. The stronger the public's environmental awareness, the greater the pressure on enterprises for green innovation. The regression coefficient of (3) is 0.008, which is significant at the 1% level. This indicates that in response to public concern about environmental issues, enterprises recognize the potential negative impacts of traditional production methods. This environmental pressure motivates companies to optimize their production processes and increase research and application of green technologies and environmental processes [31], thereby driving the implementation of green innovation within the enterprise. By introducing environmentally friendly technologies and production methods, companies can reduce pollution and resource consumption, as well as decrease carbon and waste emissions during production processes. These measures contribute to improving environmental quality [32], thus enhancing the company's reputation and image in the field of social responsibility.

Table 9. Mechanism test results.

Variables	(1)	(2)	(3)	(4)	(5)
	z_score	GRP	z_score	EBR	z_score
ENC	0.0118 ***	4.2940 **	0.0080 ***	0.0323 ***	0.0098 ***
	(0.0031)	(1.9010)	(0.0016)	(0.0088)	(0.0019)
GRP			0.0025 **		
			(0.0012)		
EBR					0.0074 ***
					(0.0027)
Constant	0.0208 ***	−20.2000 ***	0.0071 ***	0.0934 ***	−0.0029
	(0.0031)	(2.3930)	(0.0021)	(0.0111)	(0.0023)
Control variables	YES	YES	YES	YES	YES
Observations	5994	5994	5994	5994	5994
R-squared	0.2860	0.0340	0.3580	0.0140	0.1730

Note: Column (1) is the same as the first column in Table 5. The explained variable of column (2) is green technology innovation (denoted by GRP), and the explained variable of column (4) is executive environmental awareness (denoted by EBR). Columns (2) and (3) and (4) and (5) examine, respectively, how public environmental concerns influence CSR reputation through green technology innovation and executives' environmental awareness. The results show that public environmental concern not only contributes to the green technology innovation of enterprises but also enhances the environmental awareness of managers, thus effectively improving the CSR reputation. The control variables are the same as in Table 4. *** $p < 0.01$, ** $p < 0.05$.

Columns (4) to (5) in Table 9 represent the test results of how public environmental concern influences corporate social responsibility (CSR) reputation through executives' environmental awareness. The results from column (4) clearly indicate that an increase in public environmental concern is conducive to enhancing executives' environmental awareness. For every 1% increase in public environmental concern, executives' environmental awareness increased by 0.0323%. The regression coefficient in column (5) is 0.0098, which is significant at the 1% level. This suggests that an increase in public environmental concern can effectively promote the enhancement of CSR reputation through the improvement of executives' environmental awareness. With the growing prominence of global environmental issues, public environmental concern has risen, leading to increased attention to companies' environmental behaviors and their environmental impacts. Senior executives have begun to realize that actively fulfilling corporate environmental responsibilities not only contributes to environmental protection but also fosters customer goodwill and support [34], thereby enhancing corporate social responsibility reputation. They may implement stricter production standards internally, avoid negative environmental impacts during operations, promote technological innovation and production transformation, enhance the company's green competitive advantage and CSR reputation, and establish a positive corporate image [35].

6. Conclusions and Discussion

This paper constructed a comprehensive index system of CSR from five dimensions (innovation, coordination, sustainability, openness, and sharing), and the CSR of China's A-share listed companies in the Shanghai and Shenzhen stock exchanges was comprehensively estimated by using the entropy method and data from 2013 to 2021. Then, from the perspective of external supervision and internal governance, we discussed the influence factors of CSR reputation, with an emphasis on the impact of public environmental concerns. Finally, we further revealed the underlying mechanisms of CSR. The following key conclusions are drawn. First, public environmental concern can drive the enhancement of CSR reputation. Similarly, the expansion of enterprise scale is associated with a better fulfillment of social responsibility. However, a higher proportion of female managers inhibits the improvement of CSR reputation. Second, heterogeneity tests revealed that, compared with state-owned enterprises, non-state-owned enterprises benefit more from the positive effect of public environmental concern on CSR reputation. Additionally, the promoting effect of public environmental concern on CSR reputation is more significant for enterprises

in the east region than those in China's western, central, and northeastern regions. Third, the mechanism analysis results suggest that public environmental concern enhances CSR reputation through green technology innovation and executive environmental awareness.

We found that both public environmental concern and enterprise scale are significantly positively correlated with CSR reputation, consistent with previous research [18,23]. Compared with the existing literature, our study incorporated five key concepts of the new era: innovation, coordination, sustainability, openness, and sharing. Using the entropy method, we constructed a more comprehensive CSR reputation evaluation index that aligns with the characteristics of contemporary development. Our research expanded upon the relevant content of the CSR reputation evaluation system, further emphasizing the effectiveness of public environmental concern and enterprise scale in promoting CSR. Additionally, it extended the research on the impact pathway of public environmental concern on CSR reputation. However, contrary to the conclusion in existing literature where female executives mostly have a positive impact on CSR [29], our study found that an increased proportion of female managers could inhibit CSR reputation. This difference may be due to the different measurements of women's participation in management and corporate social responsibility reputation. Therefore, companies need to develop more comprehensive and meticulous CSR strategies. These findings provide valuable insights into CSR reputation-related research and offer valuable references for future studies.

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