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Retraction

Retracted: Impact of Carbon Information on Enterprise Value: Analysis Model Design Based on Big Data

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] C. Kong and Y. Zhao, "Impact of Carbon Information on Enterprise Value: Analysis Model Design Based on Big Data," *Scientific Programming*, vol. 2022, Article ID 6180988, 8 pages, 2022.

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Research Article

Impact of Carbon Information on Enterprise Value: Analysis Model Design Based on Big Data

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Investors pay more and more attention to the issue of climate change information disclosure of listed companies. Whether the company can effectively deal with the impact of climate change on its own operations and make reasonable information disclosure will undoubtedly affect the value of the enterprise. Aiming at this, an analysis model based on big data is designed for the impact of carbon information on enterprise value. This study selects the sample stocks of the Shanghai Stock Exchange responsibility index every year as the research sample, counts the carbon information through the social responsibility reports of listed companies, and uses the index method to score the carbon information of each company to measure the quality of carbon information disclosure. Firstly, it analyzes the situation of carbon information disclosure in China through descriptive statistics and then constructs relevant models to conduct an empirical analysis on the impact of carbon information disclosure on enterprise value.

1. Introduction

Enterprise environmental information includes many aspects, and carbon information is also an important aspect, including enterprise carbon emission reduction strategy, carbon emission accounting standards and methods, and so on. The carbon disclosure project (hereinafter referred to as CDP) is an independent nonprofit organization, which aims to open up a special disclosure channel for climate change and provide information support for investors, nongovernmental organizations, and policymakers [1–4]. Among the enterprises that have accepted the CDP questionnaire and disclosed carbon information to them, the enterprises in Europe and the United States have always been in the leading position, and their carbon information disclosure in the CDP questionnaire is more specific and perfect, and the degree of disclosure is relatively high [1–5].

The high-quality carbon information disclosure of these foreign enterprises has been actively promoted by investors and local laws and regulations [6, 7]. The US government promulgated the mandatory greenhouse gas reporting system in 2009, which stipulates that certain special industries and companies that emit more than 25000 tons of greenhouse gas per year must report to the EPA. In the UK, regulations related to mandatory information disclosure are also under discussion. Japanese government departments, Canada, and Australia began to implement the system of reporting greenhouse gas emissions to relevant departments in 2004 and 2007, respectively [8–10]. Based on the above information, we can see that the government continues to put forward and improve the management system to continuously improve the information disclosure level of enterprises, and at the same time, the business risk of enterprises will also increase [11–15]. This situation will not only affect the specific response measures for enterprise emission reduction but also affect the enterprise value and future development path.

People pay more attention to climate change and have a deeper awareness of environmental protection [16]. Investors and stakeholders have begun to pay attention to whether

the products and services of enterprises are low-carbon, the company's carbon footprint, carbon trading, etc. The regulatory risks, product risks, technical risks, and physical risks related to climate change will have an impact on the company's asset portfolio and cost level [17–19]. The global economy is slowly changing into a low-carbon form, which will have a great impact on the competitiveness and long-term valuation of enterprises, which is gradually realized by people in the capital market. After disclosing carbon information to the public, the company will send a signal to the capital market, representing that the company will carry out management activities related to carbon emissions, which will have an impact on the value of the enterprise. After experiencing this series of situations, the resources in the market will be redistributed among the successful and neglected enterprises.

At this stage, the level of carbon information disclosure of Chinese companies is not high, and it is still in the initial stage. Among all the listed companies, there are not many companies that disclose carbon information. Even among the enterprises that disclose carbon information, the disclosure content lacks standardization and comprehensiveness. The research of this article can make enterprises aware of the significance of carbon information disclosure so as to improve the level and quality of carbon information disclosure in Chinese enterprises. In this way, the company's image has been well packaged, and the international competitiveness and social status of Chinese enterprises have also been strengthened. The research content of this article can provide suggestions on carbon information disclosure for government regulators and relevant policymakers. By analyzing the current situation of carbon information disclosure in China, this article puts forward some suggestions that the carbon information disclosure of Listed Companies in China can be integrated with the mainstream reports and formulates relevant laws and regulations to improve the content and form of carbon information disclosure, which can make carbon information disclosure more standardized and decision-making more effective.

2. Analysis Model Design

2.1. Sample Selection and Data Sources. This article selects A shares listed on the Shanghai Stock Exchange (SSE), uses the constituent stocks of the Shanghai Stock Exchange Social Responsibility Index each year as a research sample, and retrieves their social responsibility reports disclosed in 2012–2015. The SSE Social Responsibility Index takes the stocks of companies listed on the Shanghai Stock Exchange that have performed better in social responsibility in the corporate governance sector as constituent stocks, then the index thus compiled. In the research process, this article conducts the following screening on the research samples:

(1) Excluding the financial industry.

(2) The sample companies in this study require complete data in all aspects, so companies with incomplete disclosure data are excluded.

After screening, a total of 337 pieces of eligible data were found. The annual composition of the sample companies is shown in Table 1.

The sample data are from CSMAR and WIND, and the social responsibility report is searched and downloaded from https://www.cninfo.com.cn. The explanatory variable carbon information disclosure index (CDI) is scored manually from the social responsibility reports downloaded by each sample company.

2.2. Variable Selections

2.2.1. Explained Variables: Enterprise Value. Many indicators can measure enterprise value, and the key is to divide them into accounting and market indicators. Since enterprise value is a long-term dynamic concept. However, accounting indicators are only historical indicators, and the reflected information is not comprehensive. If accounting indicators are used to measure the value of an enterprise. It is easy to produce short-sighted situations, and it is easy to make inaccurate estimates of the future risks and development status of enterprises. Accounting indicators are relatively unstable, easily manipulated, and easily affected by relevant accounting data. Judging from the above situations, the accounting indicators cannot accurately and comprehensively reflect the real operating conditions of the enterprise. Therefore, it is not suitable as an indicator to accurately reflect an enterprise value.

As a market indicator, Tobin's Q reflects the relative value of an enterprise [20, 21]. Tobin's Q is not easy to manipulate and avoids fluctuating stock prices. EVA, which is also a market indicator, also needs to be calculated, which is relatively complicated and relatively difficult to determine.

2.2.2. Explanatory Variable: Carbon Information Disclosure Index. When designing the CDI score table, this study takes the stakeholder theory as the theoretical basis, combined with previous scholars' research on environmental information disclosure and the content of carbon information disclosure in the CDP questionnaire. At the same time, combined with the actual situation of my country's listed companies, a carbon information disclosure evaluation system suitable for Chinese enterprises is constructed.

Most scholars use the index method when studying environmental information disclosure. It was indicated that the index method could more accurately describe and evaluate social responsibility information. And many foreign scholars have used this method in their studies. The main point of attention in using the index method is first to classify the information to be studied, divide it into several major categories, and then subdivide each significant category into multiple subitems. Then you can start to score each item specifically. After each item has been scored, the sum of all scores is the variable indicator to be studied.

CDP China's questionnaire is an important reference for this article. In CDP China's questionnaire, carbon information disclosure is divided into three categories: strategic management, risks and opportunities, and greenhouse gas

Table 1: Annual composition of sample companies.

Year	Number of sample companies	The same number of companies as in the previous year
2012	85	
2013	85	77
2014	86	74
2015	82	72

emissions. Then, under these three categories, we continue to distinguish 12 subindicators such as risks and opportunities brought by climate change and strategic management of carbon emission reduction. The CDI scoring table in this article combines the actual situation of Chinese enterprises and the situation of carbon information disclosure in the corporate social responsibility report. Some deletions and additions are made to the contents of the CDP questionnaire to make it more in line with the actual situation of listed companies in my country. The carbon information disclosure in this article is divided into four categories: strategies for addressing climate change, climate change governance systems and policies, carbon emission reduction measures and actions, and carbon accounting emissions. Then each category is refined and subdivided into 17 small projects, such as corporate emission reduction strategies, and some projects can be divided into qualitative disclosure and quantitative disclosure. Each item is scored against the corporate social responsibility report, with 2 scores for quantitative disclosure, 1 score for qualitative disclosure, and 0 for no disclosure. The total score for the 17 items is 27 scores. After scoring, the total score of each item is CDI. The CDI score judges the detailed level of carbon information disclosure.

After scoring, some scholars will also consider the weight of information and assign different scores to corresponding information according to the different degrees of importance of the information. This study argues that although there may be some differences in the importance of different information, there is also a lot of subjectivity when assigning weights. In this way, the score may be subjectively influenced by the scorer to a large extent. Therefore, the following research did not consider the weight problem but directly added up the scores.

The CDI score table of this study is shown in Table 2:

2.3. Control Variables. According to the previous research of many scholars at home and abroad, it can be learned that many aspects may impact carbon information disclosure. In the following empirical research, we will consider controlling some factors, which will help reflect the impact of carbon information disclosure on corporate value to a greater extent.

2.3.1. Company Size. Social public pressure refers to attracting too much attention from the public, which will bring pressure on oneself. And this pressure is very likely to be affected by the company's expansion. If the company expands, the enterprise scale will be more significant. Therefore, the larger the company expands, the greater the pressure on the public to bear because the more significant the scale of the company, the easier it is to attract attention from all walks of life.

After a series of scientific studies has proved that a series of consequences of climate change will adversely affect enterprises and individuals because it will lead to problems such as resource shortage and air pollution. With the public's attention to this issue, the company began participating in related low-carbon activities. This article's research uses the degree of enterprise development to represent the pressure mentioned above. Because the bigger the company is, the more people related to its interests and other aspects are, and the easier it is to receive attention from the outside world. Therefore, this article believes that the larger the enterprise develops, the more willing to disclose its carbon information to the outside world.

Company size is a variable often used by domestic and foreign scholars to study enterprise value. This article uses the natural logarithm of the company's total assets at the end of the year to measure the company's size. It takes the company's size as a control variable that affects its value, denoted as SIZE.

2.3.2. Ownership Concentration. So far, the academic community has not reached a clear conclusion on whether the impact of equity on enterprise value is positive or negative. This article selects the sum of the top ten shareholders' shareholding ratios in the corresponding annual reports each year to measure the shareholding concentration and control the impact of the shareholding structure on the enterprise value.

2.3.3. Profit Capacity. Investors pay attention to a company's profit capacity before investing in a business. A company's profit capacity also affects many aspects of the business, such as asset liquidity. Based on the existing research, this article regards ROE as a control variable at the end of each year and adds it to the regression model for the calculation to represent profit capacity.

2.3.4. Company Growth. The ability of a company to grow is conducive to enhancing its value. For investors, a company's growth is an essential basis for their investment decisions. The higher the company's growth, the better the future development prospects. In this way, the company's investors will have a good expectation for the company's future stock price. It can be seen from this that the stronger the company's growth, the higher the value of the company in general. Many indicators can measure the company's growth. Combined with some previous studies by scholars, this article uses the operating income growth rate to measure the company's growth.

2.3.5. Industry Attributes. The public expects industries with high-carbon emissions to fulfill more social responsibilities. The nature of the industry to which the company belongs is

Table 2: Carbon information disclosure index (CDI) score.

	Carbon information disclosure project	Introduction
Climate change strategy	(1) Identification of opportunities and risks related to climate change	1 score for disclosure, no score for nondisclosure
	(2) Integrating low-carbon development into business strategies	1 score for disclosure, no score for nondisclosure
	(3) Proposing the concept of low-carbon development	1 score for disclosure, no score for nondisclosure
	(4) Enterprise emission reduction strategy	2 scores for quantitative disclosure, 1 score for disclosure, and no score for nondisclosure
	(5) Responsibility for climate change	1 score for disclosure, no score for nondisclosure
Climate change governance and policy	(6) Setting up a management organization	1 score for disclosure, no score for nondisclosure
	(7) Establishing a reward and punishment incentive mechanism	1 score for disclosure, no score for nondisclosure
Carbon reduction measures and action	(8) Carbon reduction targets	2 scores for quantitative disclosure, 1 score for disclosure, and no score for nondisclosure
	(9) Participation in carbon trading	2 scores for quantitative disclosure, 1 score for disclosure, and no score for nondisclosure
	(10) Publicity and training on carbon emission reduction	2 scores for quantitative disclosure, 1 score for disclosure, and no score for nondisclosure
	(11) Use of low-carbon products and services	1 score for disclosure, no score for nondisclosure
	(12) Enterprises use new technologies to reduce carbon emissions	2 scores for quantitative disclosure, 1 score for disclosure, and no score for nondisclosure
Carbon accounting and emissions	(13) Standard and method of carbon emission surface calculation	2 scores for quantitative disclosure, 1 score for disclosure, and no score for nondisclosure
	(14) Carbon emission performance (emission history, emission intensity, emission reduction)	2 scores for quantitative disclosure, 1 score for disclosure, and no score for nondisclosure
	(15) Energy consumption (energy consumption energy saving, and energy intensity (energy consumption per unit of output value))	2 scores for quantitative disclosure, 1 score for disclosure, and no score for nondisclosure
	(16) Rewards and punishments received by the environmental protection department	2 scores for quantitative disclosure, 1 score for disclosure, and no score for nondisclosure
	(17) Carbon emission reduction costs	2 scores for quantitative disclosure, 1 score for disclosure, and no score for nondisclosure

different, and the level of carbon information disclosure is different. At the same time, the industry attribute may impact the relationship between carbon information disclosure and corporate value. In addition, industry differences may affect the level of carbon information disclosure of enterprises.

According to the list of carbon emissions released by the Chinese Academy of Sciences, the top five industries with carbon emissions are defined as high-carbon emission industries, and the remaining industries are low-carbon emission industries. In this study, the industry attributes are assigned a value of 1 for companies in industries with high-carbon emissions and 0 for companies in industries with low-carbon emissions.

2.3.6. Nature of Ownership. Generally speaking, there is a relatively close relationship between state-owned enterprises and the government. Because of such a relationship, the public believes that state-owned enterprises should shoulder more environmental responsibilities than nonstate-owned enterprises. Our country's state-owned enterprises are different. Compared with other enterprises, they may fulfill more energy conservation and emission reduction responsibilities, and the disclosure of carbon information will be more comprehensive. This study uses the ownership nature of the firm as a control variable. If the state controls the company, then set this item to 1. Otherwise, it is 0; see Table 3.

2.4. Model Construction. This article uses a linear regression equation in an empirical study to examine the impact of a company's carbon disclosure on corporate value. The model used in this article is as follows: in the research, some frequently used variables are selected as control variables in the empirical analysis, such as enterprise size and ownership concentration, using CDI as an independent variable in the model results from scoring the carbon information disclosure index. Tobin's Q was used as the dependent variable in the study [20, 21]. Model 1 is constructed to study the impact of carbon information disclosure on corporate value.

Table 3: Description of research variables.

Variable type	Variable type	Variable symbol	Metrics	Calculation method
Explained variable	Corporation value	Q	Tobin's Q	Tobin's Q value = market capitalization at the end of the year/total assets at the end of the year
Explanatory variables	Carbon information disclosure level	CDI	Carbon disclosure index	Score table
	Company size	SIZE	Total assets	Company size = logarithm of total assets at the end of the year
	Ownership concentration	OCN	Shareholdings of the top ten shareholders	Ownership concentration = the sum of the shareholding ratios of the top ten shareholders
	Profit capacity	ROE	Return on equity	Return on equity = profit after tax/Owner's equity
	Company growth	GROWTH	Operating income growth rate	Company growth = (operating income at the end of the current period – operating income at the end of the previous period)/operating income at the end of the previous period
Control variable	Industry attributes	IND	Virtual variable, whether it is a high-carbon emission industry	According to the list of carbon emissions released by the Chinese Academy of Sciences, the top five industries with carbon emissions are defined as high-carbon emission industries, and the remaining industries are low-carbon emission industries. Companies in industries with high-carbon emissions are given a value of 1, and those with low-carbon emissions are given a value of 0
	Nature of ownership	STATE	Virtual variable, whether state-owned	1 for state, 0 for nonstate
	Year	YEAR	Virtual variable, set by year	In 2012, 2013, and 2014, set Y1, Y2, and Y3, respectively, set the current year to 1, and set the rest to 0

Model 1.

$$Q = \beta_0 + \beta_1 \mathrm{CDI} + \beta_2 \mathrm{SIZE} + \beta_3 \mathrm{OCN} + \beta_4 \mathrm{ROE} + \beta_5 \mathrm{GROWTH} + \beta_6 \mathrm{STATE} + \beta_7 \mathrm{YEAR} + \varepsilon. \quad (1)$$

At the same time, the model more deeply verifies whether the industry in which the company operates will have an impact on the relationship between the two. Therefore, the factor of IND is added to the interaction term of CDI.

Model 2.

$$Q = \beta_0 + \beta_1 \mathrm{CDI} + \beta_2 \mathrm{CDI} * \mathrm{IND} + \beta_3 \mathrm{SIZE} + \beta_4 \mathrm{OCN} + \beta_5 \mathrm{ROE} + \beta_6 \mathrm{GROWTH} + \beta_7 \mathrm{STATE} + \beta_8 \mathrm{YEAR} + \varepsilon, \quad (2)$$

where β_0 is the constant term in the regression equation, β_i is the coefficient evaluated for each explanatory variable, and ε is the random disturbance item.

3. Empirical Analysis

3.1. Correlation Analysis. To eliminate the influence of individual effects on the correlation between variables, the average value of each variable is calculated with the company as the unit. Then the correlation analysis is carried out. In this article, SPSS 19.0 [22, 23] is used to test the correlation of each variable in the model, and the test results are shown in Table 4.

From the correlation test, we can see a correlation between enterprise value and other variables, but the correlation between the respective variables is not exceptionally high.

3.2. Multiple Linear Regression Analysis. Since the sample companies from 2012 to 2015 are not the same, and the short time is only four years, the four-year sample is aggregated as cross-sectional data for regression analysis. Table 5 shows the multiple regression [24–29] results of the impact of carbon information disclosure on corporate value. It can be seen from Table 5 that the overall fitting degree is 0.336, indicating that the selection of explanatory variables in the model is reasonable. The variance inflation factor VIF of each variable is less than 2, meaning no multicollinearity problem among the variables.

Analysis of the regression coefficient shows that the correlation coefficient between the CDI and the enterprise value is 0.035, the significance is 0.037, and it is significantly positively correlated at the 5% level, which verifies that carbon information disclosure has a positive effect on corporate value. The correlation coefficient between the interaction term CDI * IND and corporate value is 0.086, with a significance of 0.002. It is also significantly positively correlated at the 5% level, indicating that industry factors can significantly impact the relationship between carbon information disclosure and corporate value.

In addition, enterprise value and company size are significantly negatively correlated. It shows that the expansion of the company's scale in this study is not

Table 4: Correlation test of each variable.

	Q	CDI	CDIND	SIZE	OCN	ROE	GROWTH	STATE
Q	1							
CDI	−0.063	1						
CDIND	0.142*	0.161**	1					
SIZE	−0.438*	0.467**	0.076	1				
OCN	0.077	0.382**	0.142**	0.359**	1			
ROE	0.204*	−0.016	−0.044	0.031	0.057	1		
GROWTH	0.083	−0.092	−0.052	0.063	−0.042	0.312**	1	
STATE	−0.166*	0.108	0.072	0.232**	0.151**	−0.190**	−0.207	1

Table 5: Multiple regression results of the impact of carbon information disclosure on corporate value.

	Unstandardized coefficients		Standardized coefficient			
	B	Standard error	Beta	T	Significance	VIF
Constant	10.247	0.094		11.367	0	
CDI	0.035	0.017	0.107	2.058	0.037	1.407
CDIND	0.086	0.027	0.151	3.265	0.002	1.04
SIZE	−0.439	0.043	−0.575	−10.795	0	1.417
OCN	0.013	0.003	0.222	4.457	0	1.257
ROE	2.542	0.683	0.182	3.727	0	1.166
GROWTH	0.007	0.005	0.089	1.81	0.073	1.137
STATE	−0.14	0.12	−0.057	−1.137	0.254	1.115
R-squared	0.338					
Adjusted R-squared	0.323					
F value	23.764					

Table 6: The impact of carbon information disclosure levels in different industries on corporate value.

	Group of high-carbon emission industries			Group of low-carbon emission industries		
	Beta	T	Sig	Beta	T	Sig
Constant	8.403	2.109	0.045	10.429	11.294	0
CDI	0.259	3.948	0	0.025	1.189	0.237
SIZE	−0.402	−2.264	0.032	−0.447	−10.666	0
OCN	0.013	0.916	0.365	0.016	4.697	0
ROE	3.26	2.225	0.035	2.243	2.842	0.007
GROWTH	0.002	0.303	0.762	0.004	1.706	0.088
STATE	0.045	0.103	0.919	−0.145	−1.143	0.253
Adjusted R-squared		0.313			0.335	
F value		3.864			25.755	

necessarily conducive to improving corporate value. On the contrary, the larger the company's scale is, the more likely it is to be exposed to risks and the more likely it is to be pressured by the outside world, which is not conducive to the growth of corporate value. The equity concentration and enterprise value are positively correlated at the level of 1%, indicating that increasing the equity concentration is conducive to the centralized management of enterprises and has a positive effect on enterprise value; enterprise value and profit capacity ROE are significantly positively correlated at the level of 1%, indicating that the higher the profit capacity of the enterprise, the greater the enterprise value.

3.3. Comparative Analysis by Industry. In this article, through group regression [28], the sample data of the high-carbon emission industry group and the low-carbon emission industry group are, respectively, substituted into Model 1 to examine the impact of carbon information disclosure in different industries on corporate value. The regression results are shown in Table 6.

It can be seen from Table 6 that the regression coefficient of the carbon information disclosure index and an enterprise value of high-carbon emission industries is 0.259, which is significantly positively correlated at the level of 1%. Still, the correlation coefficient between the level of carbon information disclosure and enterprise value in low-carbon emission industries is 0.025. The significance is 0.237, which is greater than the significance level, indicating that the CDI [30–33] of the sample of low-carbon emission industries does not correlate with the enterprise value.

The empirical analysis results show that the carbon information disclosure index of the overall sample enterprises is significantly positively correlated with the enterprise value. The same conclusion was drawn from the analysis of high-carbon emission sample enterprises. However, the

analysis results of low-carbon emission sample enterprises show no correlation between the two, which can indicate that industry factors impact the relationship between carbon information disclosure and enterprise value. Compared with low-carbon emission industries, the positive correlation between carbon information disclosure and enterprise value in high-carbon emission industries is more significant.

4. Conclusions

This study creatively combines the legitimacy theory, the effectiveness theory of the capital market, and other related theories with carbon information disclosure and takes these classical theories as the basis to study the impact of carbon information disclosure on enterprise value, which provides a reference for China's research on carbon information disclosure and a new idea for researchers' in-depth research in this field. First of all, it makes a descriptive analysis of the relevant quantitative characteristics of carbon information disclosure and analyzes the quality of carbon information disclosure between different years and different industries. Then, we carry out multiple linear regression to analyze the impact of carbon information disclosure on enterprise value. Then, the industry factors are added to the regression to verify whether the carbon information disclosure of high-carbon emission industries has a greater impact on enterprise value than that of low-carbon emission industries by setting the carbon information disclosure level and the industry multiplier.

Globally, the problems caused by the deterioration of the climate and ecological environment are becoming more and more serious. Therefore, energy conservation and emission reduction are currently a very important task for both relevant government departments and individuals in the society because this environment is closely related to and inseparable from everyone. The company is a major emitter of greenhouse gases, so it should bear more responsibility for energy conservation and emission reduction. There are many ways to strengthen the awareness of enterprise carbon information disclosure, such as low-carbon publicity and training of internal employees on low-carbon development. Let enterprises take the initiative to disclose carbon information to promote green and low-carbon development. Nowadays, China is facing severe ecological and environmental problems, so it is very important to disclose carbon information on time and comprehensively. The government has many tasks to shoulder. It needs to find ways to improve the awareness of carbon information disclosure of enterprises and give clear rewards or punishments to relevant enterprises. Only in this way can the overall situation of carbon information disclosure in China be improved.

Data Availability

The dataset can be accessed upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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