

Empirical Analysis on the Factors Influencing Carbon Accounting Information Disclosure of Enterprises in a Low Carbon Economy

Lihan Chen

Xi'an International Studies University, Xi'an, Shaanxi, China

lisa_kid@163.com

Abstract. With the acceleration of global industrialization, energy consumption is increasing year by year, leading to an increasing carbon emission and becoming a key issue of concern for countries around the world. Based on the literature review and data collection at home and abroad, this paper makes a theoretical analysis of the impact of six factors on the level of carbon accounting information disclosure, namely, net return on equity, corporate solvency, basic earnings per share, years of listing, state-owned holding enterprises, and heavily polluting enterprises, and puts forward corresponding assumptions. Subsequently, through analysis and organization, this article selected 100 eligible listed companies in the Shanghai and Shenzhen A-share markets from 2019 to 2021 as the research subjects. The carbon accounting information disclosure index method was used to quantify the level of carbon accounting information disclosure as an explanatory variable, and six influencing factors were combined for empirical research. The following conclusion is drawn: Currently, the level of carbon accounting information disclosure of listed companies in China is average. Among them, the net return on equity, basic earnings per share, state-owned holding enterprises and heavily polluting enterprises are positively related to the level of carbon accounting information disclosure, while the asset liability ratio of enterprises and the number of years of listing are negatively related to the level of carbon accounting information disclosure. Finally, based on a combination of theoretical and empirical analysis, this article proposes relatively objective and feasible suggestions from the national, social, and corporate levels to improve the level of carbon accounting information disclosure by listed companies and help them achieve vigorous development in the future.

Keywords: Carbon Accounting; Carbon Accounting Information Disclosure; Low-carbon Economy.

1. Introduction

In recent years, the global industrialization process has accelerated, and energy consumption has been increasing year by year, resulting in a continuous increase in carbon emissions. Extreme weather conditions have also occurred frequently, becoming a key issue of concern for countries around the world. China is also gradually exploring the path of a low-carbon economy. In recent years, the term "carbon accounting" has gradually become a cutting-edge topic in the field of accounting research. The disclosure of carbon accounting information is an extremely important part of the foundation of carbon accounting. However, due to the current weak awareness of enterprises in disclosing carbon accounting information, there are very few ways for the public to understand the carbon emission information of each enterprise. As the main responsibility bearers of pollutants and carbon emissions, companies have the obligation to disclose carbon accounting information for their carbon emissions. This not only facilitates the supervision and management of relevant departments, but also facilitates the public's understanding and evaluation of the enterprise, exposing the weaknesses of environmental protection, strengthening external supervision, and promoting the vigorous development of the enterprise. Therefore, research on carbon accounting information disclosure is of great significance for the development of China's low-carbon economy. From a theoretical perspective, the disclosure of carbon accounting information is beneficial for accounting experts and scholars to conduct research and analysis on the disclosed information, discover changes in the level of carbon accounting information disclosure from annual data, and predict the possible development of China's low-carbon economy in the future. From a practical perspective, the disclosure of carbon

accounting information can reflect the level of awareness of various enterprises regarding carbon accounting information disclosure, and reflect whether China's pursuit of a low-carbon economy is steadily promoting and developing.

2. Literature Review

Domestic scholars have different understandings of the definition and content of carbon accounting. Zhang Ying (2020) believed that carbon accounting has emerged with the wave of low-carbon economy, mainly focusing on accounting recognition, measurement, recording, and disclosure issues when obtaining carbon emission rights from a traditional accounting perspective. However, Shi Wenwen and Zeng Ting (2022) pointed out that carbon accounting is an emerging accounting discipline that is based on energy and environmental laws and regulations, and recognizes, measures, and reports the performance of low-carbon responsibilities, energy conservation, consumption reduction, and pollution reduction by enterprises in monetary and practical units or in written form, revealing the efficiency of natural capital and social benefits of enterprises. Compared to domestic scholars, foreign scholars have conducted more extensive research on carbon accounting information disclosure. Janek and Stewart (2008) believed that carbon accounting should be divided into two parts: carbon emission accounting and carbon fixed accounting, and carbon accounting should be included in the system of implementing carbon emission management in enterprises. Hespeneide Eric (2010) and others believed that carbon accounting should include both monetary and non-monetary aspects.

Based on this, domestic scholars have conducted research on carbon accounting information disclosure, but it was not profound and mostly only stayed at the theoretical level. Jiang Zhicheng (2022) believed that carbon accounting information disclosure can generally include two categories: accounting information disclosure in financial reports and accounting information disclosure outside of financial reports. Xie Lina (2020) believed that there are three problems in China's carbon accounting information disclosure: low level and large industry gap, need for improvement in quality and quantity, as well as inconsistent disclosure methods and lack of independence. However, Wang Hui, Hao Xiangrong, and Yang Meili (2019) believed that there are four main problems in China's carbon accounting information disclosure: outdated theoretical research and development, scattered disclosure structure, lack of standardization, lack of supervision and audit verification, and a lack of attention from stakeholders and the public to carbon accounting information. Li Tingting (2019), by using the theory of corporate social responsibility, the theory of sustainable development and the theory of externality as the basis for the research on carbon accounting information disclosure, put forward suggestions to strengthen the importance of enterprises on carbon accounting information disclosure, standardize the path and way of carbon accounting information disclosure and improve the regulatory system of carbon accounting information disclosure. Foreign scholars have also conducted corresponding research on carbon accounting information disclosure and generated different perspectives. Hartmann Frank (2013) believed that in smaller enterprises, carbon accounting information should be reflected in the notes to the company's financial statements. Donald MacKenzie (2011) believed that companies should prepare independent carbon financial statements to comprehensively reflect carbon emissions and other aspects.

Subsequently, domestic scholars conducted research on the influencing factors of carbon accounting information disclosure. Liu Yiping and Yang Peiru (2017) selected the 2015 Top 100 Chinese Enterprises published by the authoritative magazine *Fortune* as research samples, constructed a multiple regression model, and used professional statistical software to conclude that there is a positive correlation between industry category, enterprise size, and governance structure and the dependent variable CAID, while a negative correlation between debt level and the dependent variable CAID. Chen Qi, He Sufan, and Gou Jianhua (2013) selected 52 listed companies in Zhejiang as the research subjects and conducted regression analysis using STATA 12.0 statistical software. They proved that the larger the company size, the higher the state-owned shareholding rate, and the better the company's growth ability, the more willing they are to disclose carbon accounting

information. Foreign scholars have conducted research on the influencing factors of carbon accounting information disclosure in various forms and with rich content. So, Michael (2023) extracted 1407 samples from the Chinese market from 2019 to 2021, used multiple linear regression to analyze the impact of CAID on R&D investment, verified the moderating effect of sustainability on both, and conducted a robustness test, and concluded that the higher the quality of CAID, the greater the R&D investment of listed companies; The stronger the sustainability, the stronger the promoting effect of CAID quality on R&D investment. Elizabeth Stanny (2010) studied the voluntary disclosure of greenhouse gas emissions by S&P 500 index companies to the Carbon Disclosure Program (CDP) in the United States, analyzed data from 2006 to 2008, and concluded that the level of carbon accounting information disclosure by companies in previous years is the most important variable in interpreting subsequent disclosure levels.

This article uses a combination of theory and empirical research to conduct research, and finds that the level of carbon accounting information disclosure in China is still in the early stage of development. Therefore, there is still great room for improvement.

3. Theoretical Analysis

3.1 Qualitative Analysis

1) State-owned holding enterprises and the level of carbon accounting information disclosure

According to the nature of controlling shareholders as the classification criteria, the listed companies selected in this article are state-owned and non-state-owned respectively. The difference between state-owned holding and non-state-owned holding lies in the fact that the actual controller of state-owned holding enterprises is the state. While being influenced by national policies, they also actively respond to and implement national policies, playing a leading role. Developing a low-carbon economy has become one of China's strategic goals, and environmental benefits have also become a goal pursued by many enterprises. Enterprises fulfilling their social responsibilities not only fulfill their obligations to society, but also create more long-term economic benefits for themselves. Therefore, when enterprises implement policies related to social and low-carbon environmental protection, they will not occupy the time and resources for pursuing benefits. On the contrary, it will promote the sustainable development of enterprises. State owned holding enterprises usually better fulfill their social responsibility obligations. Therefore, when the government implements low-carbon environmental protection related policies, compared to non-state-owned holding enterprises, they tend to be more proactive in disclosing carbon accounting information and assume their social responsibility obligations.

2) Heavy polluting enterprises and the level of carbon accounting information disclosure

At present, China's environmental protection system has not yet formed and is still in its initial stage. However, China has gradually formulated and introduced many laws, regulations, and policy rules related to carbon emissions. However, these rules and regulations are not perfect, and the punishment for enterprises that violate emission standards is not sufficient, resulting in some enterprises being punished for violating environmental protection laws and regulations every year. Therefore, in this process, heavily polluting enterprises are the key targets for regulation and governance, undertaking the main task of energy conservation and emission reduction. At the same time, such enterprises are also the focus of attention and supervision by the public and the state. Based on this, heavily polluting enterprises will more actively disclose environmental related accounting information and assume corresponding social responsibilities compared to non-heavily polluting enterprises. For heavily polluting enterprises, they should not only become a key concern and governance enterprise of the environmental protection department in the process of environmental protection, but also become a pioneer enterprise on the road of environmental governance. They should actively take measures related to energy conservation and emission reduction, withstand the supervision of relevant departments and the state, and withstand the supervision of the masses. They

should actively disclose information and social responsibility reports related to carbon emissions, and assume their responsibilities.

3.2 Quantitative Analysis

1) Enterprise Net Return on Equity and Carbon Accounting Information Disclosure Level

In the process of development, most enterprises usually consider improving their own image and expanding their social influence while pursuing profits. However, few enterprises can balance their social and environmental responsibilities while pursuing economic benefits. In the process of development, usually listed companies with higher net return on equity can allocate more funds to purchase, update and maintain energy-saving and emission reduction equipment, and have huge investment in low-carbon technology research and development. This type of enterprise will have a better low-carbon awareness, and will be more willing to disclose carbon accounting related information and assume their social and environmental responsibilities, and pursue a low-carbon economy more. Therefore, from a comprehensive perspective, such enterprises often attract more attention from investors, thereby obtaining high-quality investment and forming a virtuous cycle. On the contrary, enterprises with lower net return on equity tend to pay more attention to their own economic interests, so they have little spare energy to pay attention to the social environment. They do not research and develop low-carbon environmental protection equipment, disclose less carbon accounting information, or even do not disclose it. Therefore, companies with strong profitability tend to attach greater importance to their social and environmental responsibilities and actively disclose carbon accounting information compared to companies with weak profitability.

2) Enterprise Asset Liability Ratio and Carbon Accounting Information Disclosure Level

The asset liability ratio of a company is an indicator used to measure its ability to utilize funds provided by creditors for business activities, as well as to reflect the safety level of loans issued by creditors. This indicator is a comprehensive indicator for evaluating a company's debt level, and can also reflect the company's financial situation from another perspective. With the development of China's low-carbon economy and the implementation of energy-saving and emission reduction policies, the impact of carbon emissions in enterprises on their economic benefits and financial risks is becoming increasingly evident. Paying fines for non compliant emissions, purchasing low-carbon equipment, and updating and maintaining low-carbon equipment will all reduce the economic benefits of enterprises. Therefore, when the asset liability ratio of a company is high, such companies are often more willing to disclose carbon accounting information, which will better showcase the company's own situation and help investors have a more comprehensive understanding of the company, thereby expanding the company's financing channels. Therefore, companies with high asset liability ratios are usually more willing to disclose carbon accounting information to help improve their information and attract more investors to invest in the company.

3) The Years of Enterprise Listing and the Level of Carbon Accounting Information Disclosure

The longer the company's listing period, the more complete and mature its development in management, operation, and other aspects. In addition, companies with longer listing years will have stronger strength to consider environmental factors and have a greater sense of social responsibility compared to companies with shorter listing years, in order to achieve long-term development. Therefore, companies with longer listing years usually disclose more carbon accounting information compared to companies with shorter listing years.

4) Basic earnings per share of enterprises and the level of carbon accounting information disclosure

The basic earnings per share of a company can reflect its earnings per share, and typically, companies with higher earnings per share have higher market recognition. Enterprises with higher basic earnings per share often have better operating conditions and profitability. Therefore, compared to enterprises with lower basic earnings per share, they have more energy, time, and costs to invest in low-carbon equipment and pursue a low-carbon economy. The market also has high expectations for them. Disclosure of carbon accounting information can help such enterprises shape a more comprehensive and comprehensive corporate image, thereby attracting high-quality investors to

invest in them and promoting their future development. Therefore, companies with high basic earnings per share are usually more willing to disclose carbon accounting information compared to companies with low basic earnings per share.

4. Empirical Research

Table 1. Scoring Table for Carbon Accounting Information Disclosure Level

	Disclosure items	Specific description	Score	Explain
Monetary measurement items	R&D investment	Whether to reduce carbon emissions and investment amount through low-carbon equipment procurement or other means	0,1,2	The project was not disclosed as 0, but was qualitatively or briefly described as 1, and quantitatively or in detail described as 2
	Energy consumption	Enterprise carbon emissions and energy consumption	0,1,2	The project was not disclosed as 0, but was qualitatively or briefly described as 1, and quantitatively or in detail described as 2
	Violations and penalties of carbon emissions by enterprises	Penalties and amounts for carbon emissions violations committed by enterprises	0,1,2	The project was not disclosed as 0, but was qualitatively or briefly described as 1, and quantitatively or in detail described as 2
	Obtaining government special fund subsidies	Environmental subsidies and other amounts from national and local governments	0,1,2	The project was not disclosed as 0, but was qualitatively or briefly described as 1, and quantitatively or in detail described as 2
	Greenhouse gas emissions	Greenhouse gas emissions from enterprises	0,1,2	The project was not disclosed as 0, but was qualitatively or briefly described as 1, and quantitatively or in detail described as 2
	interpretative statement	Does the enterprise use data or charts to further explain the difficult to understand content in the disclosure	0,1,2	The project was not disclosed as 0, but was qualitatively or briefly described as 1, and quantitatively or in detail described as 2
Non- monetary measurement items	Low carbon awareness concept	Does the enterprise have a low-carbon awareness	0,1	Conscious is 1, unconscious is 0
	Energy conservation and emission reduction measures	Do enterprises have relevant emission reduction measures	0,1	1 with measures, 0 without measures
	Establish a dedicated environmental protection department	Is there a dedicated environmental protection department established	0,1	Set specialized environmental protection department to 1, not set to 0
	Conduct of fulfilling environmental protection related policies and regulations	Consciously and strictly abide by relevant environmental policies and laws and regulations	0,1	Compliance with policies and regulations is 1, non-compliance is 0
	Effect of emission reduction promotion	Is it necessary to promote energy conservation and emission reduction to enhance employees' awareness of emission reduction	0,1	1 for promotion and training, otherwise 0
	Continuous disclosure	Has carbon information been disclosed annually since its initial disclosure	0,1	Disclosure is 1 every year since the initial disclosure, otherwise 0
	Regulatory requirements	Whether the company's disclosure of products or projects comply with domestic and international regulatory emission requirements	0,1	Compliant with 1, otherwise 0

This article selects listed companies in the Shanghai, Shenzhen, and Beijing A-share markets as the research objects to study their carbon accounting information disclosure levels in 2019, 2020, and 2021, and screen them according to the following methods: (1) Excluding financial industry enterprises; (2) Excluding all ST and ST * companies; (3) All companies with incomplete data and outlier are excluded. Finally, this article identified 296 sample data from 100 enterprises through screening, analysis, and organization. The data used were all sourced from the annual balance sheets, various financial data, and company profiles of enterprises on Dongfang Wealth Net, as well as the annual reports and social responsibility reports of Sina Finance and Economics. The professional statistical analysis tool Eviews 10 was used to conduct empirical analysis on the data.

4.1 Variables

1) Variable selection

a) Dependent variable

This article selects the level of carbon accounting information disclosure as the dependent variable. This article selects appropriate indicators through extensive literature and materials, and classifies them into monetary and non-monetary measurements; Then, based on the annual report of the enterprise, assign values and scores to the different and degree of disclosure content; Finally, the scores of all indicators are added to calculate the total score, and an evaluation is made to form a carbon accounting information disclosure scoring standard table, as shown in Table 1. This article sets a total of 13 scoring items and corresponding scores. According to Table 1, this article organizes and analyzes the collected data, scores them, and finally sums them up.

The calculation formula for carbon accounting information disclosure level (CDI) is:

$$CDI_i = \frac{\sum CDI_i}{BCDI} \quad (1)$$

(Among them, $\sum CDI_i$ is the sum of the CDI scores of the i-th high carbon emission listed company, while BCDI is the sum of the best disclosure project scores)

b) Explanatory variable

Table 2. Variable Symbol Description Table

Variable type	Variable Name	Representative symbol
Dependent variable	Carbon accounting information disclosure level	CDI
Explanatory variable	Enterprise net return on equity	ROE
	Corporate solvency	CAPABILITY
	Years of listing of enterprises	YEAR
	Basic earnings per share of the enterprise	EPS
	State controlled enterprises	OW
	Heavy polluting enterprises	IT

Net Return on EQUITY (ROE)

The higher the ROE indicator, the higher the return on investment; On the contrary, the lower the ROE indicator, the weaker the profitability of the owner's equity of the enterprise. Therefore, this article selects this indicator as a measure of corporate profitability.

Enterprise Asset Liability Ratio (CAPABILITY)

This indicator is used to measure the ability of a company to use funds provided by creditors for business activities, as well as to reflect the safety level of loans issued by creditors. It is a comprehensive indicator to evaluate the company's debt level and can also reflect the company's financial situation from another perspective.

Years of Enterprise Listing (YEAR)

This indicator can reflect the establishment time and listing years of a company. The longer a company has been listed, the earlier it is established, the higher its concentration in the industry, and the better its brand advantage.

Basic earnings per share (EPS)

This indicator can reflect the earnings per share of a company, and the higher the earnings per share, the higher the recognition of the company in the market.

State Owned Enterprise (OW)

This indicator is a dummy variable. If the sample enterprise is a state-owned holding enterprise, the value is 1, otherwise the value is 0.

Heavy polluting enterprises (IT)

This indicator is also a dummy variable. If the sample enterprise is a heavily polluting enterprise and has received environmental penalties, the value is 3, and if it has not received environmental penalties, the value is 2; If the sample enterprise is not a heavily polluting enterprise but has received environmental penalties, the value is 1, and if it has not received environmental penalties, the value is 0.

2) Model Construction and Assumptions

This paper constructs a multiple linear regression model to test the relationship between the level of carbon accounting information disclosure and enterprises' net return on equity, solvency, years of listing, basic earnings per share, state-owned holding enterprises, and heavily polluting enterprises.

$$CDI = \beta_{ROE} + \beta_{CAPABILITY} + \beta_{YEAR} + \beta_{EPS} + \beta_{OW} + \beta_{IT} \quad (2)$$

This article makes the following assumptions based on the analysis of the above variables:

Assumption 1: There is a positive correlation between state-owned holding enterprises (OWs) and the level of carbon accounting information disclosure (CDI). The nature of the enterprise is a state-owned listed enterprise, and the level of carbon accounting information disclosure is higher.

Assumption 2: There is a positive correlation between heavily polluting enterprises (IT) and the level of carbon accounting information disclosure (CDI). Listed companies that are heavily polluting enterprises have a higher level of carbon accounting information disclosure.

Assumption 3: Net return on equity (ROE) is positively correlated with carbon accounting information disclosure level (CDI). The stronger the profitability of listed companies, the higher the level of carbon accounting information disclosure.

Assumption 4: There is a positive correlation between the enterprise's asset liability ratio (CAPABILITY) and the level of carbon accounting information disclosure (CDI). The higher the asset liability ratio of listed companies, the higher the level of carbon accounting information disclosure.

Assumption 5: There is a positive correlation between the company's years of listing (YEAR) and the level of carbon accounting information disclosure (CDI). The longer the listing period of a listed company, the higher the level of carbon accounting information disclosure.

Assumption 6: There is a positive correlation between the basic earnings per share (EPS) of a company and the level of carbon accounting information disclosure (CDI). The higher the basic earnings per share of listed companies, the higher the level of carbon accounting information disclosure.

4.2 Empirical Testing

1) Descriptive Statistical Analysis

Firstly, this article provides a statistical description of the general characteristics of research variables from 2019 to 2021, and obtains the general attributes of these variables. The results are shown in the table:

a) Descriptive statistics of the dependent variable

From Table 3, it can be seen that the average level of carbon accounting information disclosure has increased from 7.4388 in 2019 and 2020 to 8.2347 in 2021. This indicates that with the deepening

development of China's low-carbon economy, listed companies have increased their awareness of implementing energy-saving and emission reduction measures, developing low-carbon economy, and fulfilling social and environmental responsibilities. Compared to before, they are more willing to actively disclose carbon accounting information.

Table 3. Descriptive Statistical Table of Carbon Accounting Information Disclosure Level

CDI	N	Minimum value	Maximum value	Average value	Standard deviation
2019	98	1	15	7.4388	3.4910
2020	98	2	15	7.4388	3.2461
2021	98	1	15	8.2347	3.4426

From the highest point of view, the maximum and minimum values over the three years were 15 and 1, respectively, and the standard deviation did not change much and remained relatively stable, between 3.2 and 3.5. This indicates that there is a significant difference in the level of carbon accounting information disclosure among listed companies, and the awareness of carbon accounting information disclosure varies among enterprises. This indicates that the level of carbon accounting information disclosure among listed companies is average, and there are still shortcomings that need to be improved over a long period of time.

b) Descriptive statistics of explanatory variables

Table 4. Descriptive Statistical Table of Independent Variables

	Number of cases	minimum value	Maximum value	average value	standard deviation
ROE	294	-4.27	0.40	0.0315	0.3257
CAPABILITY	294	0.03	1.01	0.4700	0.2097
YEAR	294	0.08	29.92	14.1958	8.38451
EPS	294	-4.95	5.43	0.5032	1.0714

From the statistical results in Table 4, it can be seen that the net return on equity of the enterprise ranges from the minimum value of -4.27 to the maximum value of 0.392940, while the basic earnings per share of the enterprise ranges from the minimum value of -4.95 to the maximum value of 5.43, with the standard deviation reaching 0.33 and 1.07 respectively, indicating that the net return on equity and basic earnings per share of the sample enterprises differ greatly, indicating that the sample range of companies selected in this paper is wide and reasonable; The minimum value of the enterprise's asset liability ratio is 0.03, the maximum value is 1.01, and the average value is 0.47, indicating that nearly half of the listed companies have poor debt paying ability and overall profitability; For the listing years of enterprises, the minimum value ranges from 0.08 to the maximum value of 29.92, with a standard deviation of 8.38, indicating significant differences in the listing years of the sample enterprises. Each enterprise is at different stages of development, and the sample selection is reasonable.

Table 5. Factor correlation analysis results

	ROE	CAPABILITY	YEAR	EPS	OW	IT
ROE	1.0000					
CAPABILITY	-0.3292	1.0000				
YEAR	-0.0140	0.1119	1.0000			
EPS	0.4864	-0.2259	-0.0447	1.0000		
OW	0.0625	0.0017	0.3003	0.0854	1.0000	
IT	-0.0124	-0.0218	0.1612	-0.0066	0.2306	1.0000

2) Correlation statistical analysis

In order to avoid the situation where significant correlations between variables affect the regression results, correlation analysis is used to determine whether there is a correlation between variables before conducting regression analysis. The results are shown in Tables 5.

From Table 5 above, it can be seen that the correlation between the six selected variable factors is not significant, so regression analysis is conducted on the variables.

3) Regression analysis

After completing descriptive statistical analysis and correlation analysis, this article used the professional statistical analysis tool Eviews 10 for regression analysis, and obtained the following table:

Table 6. Regression equation significance test table

Variable	Coefficient	Standard error	t-statistic	Probability
C	6.507705	0.441387	14.743749	0.000000
ROE	1.550288	0.556899	2.783791	0.005730
CAPABILITY	-1.468949	0.723482	-2.030389	0.043239
YEAR	-0.014055	0.018017	-0.780125	0.435961
EPS	0.384034	0.164490	2.334709	0.020248
OW	0.744982	0.316207	2.355999	0.019146
IT	2.127837	0.148512	14.327755	0.000000
R-squared			0.500011	
Adjusted R-squared			0.489559	
F-statistic			47.835522	
Prob(F-statistic)			0.000000	

From the positive and negative directions of the coefficients of the six independent variables in Table 6, it can be seen that the coefficients of the net return on equity (ROE), basic earnings per share (EPS), state-owned holding enterprises (OW) and heavily polluting enterprises (IT) are all positive numbers, indicating that these four variables are significantly positively correlated with the carbon accounting information disclosure level of listed companies at a significance level of 5%, which is consistent with the previous assumptions.

Table 7. Heteroscedasticity test table

Variable	Coefficient	Standard error	t-statistic	probability
C	6.507705	0.440801	14.763361	0.000000
ROE	1.550288	0.447813	3.461909	0.000618
CAPABILITY	-1.468948	0.738621	-1.988770	0.047676
YEAR	-0.014055	0.016731	-0.840084	0.401560
EPS	0.384034	0.169278	2.268655	0.024032
OW	0.744982	0.329501	2.260943	0.024512
IT	2.127837	0.164422	12.941293	0.000000
R-squared			0.500011	
Adjusted R-squared			0.489559	
F-statistic			47.835522	
Prob(F-statistic)			0.000000	
Prob(Wald F-statistic)			0.000000	

The coefficient of enterprise listing years (YEAR) is negative, and the correlation between this variable and the level of carbon accounting information disclosure is not significant, which is inconsistent with the hypothesis. This result may be due to, on the one hand, different companies may be affected by factors such as different industries, development cycles, or national policies, so the years of listing between companies cannot significantly reflect the correlation; On the other hand,

some companies with long listing years may pay less attention to carbon accounting information, carbon emissions, and other issues during their development process, and focus more on improving the economic profits and profitability of the company. In recent years, as China has increasingly focused on environmental issues, general secretary Xi Jinping also emphasized at the conference that *Lucid waters and lush mountains are invaluable assets*. Therefore, companies that have been listed in recent years, namely those with short listing years, may be more inclined to disclose more carbon accounting information compared to those with long listing years.

Similarly, the coefficient of a company's asset liability ratio is negative, indicating a negative correlation between the company's asset liability ratio and the level of carbon accounting information disclosure, which contradicts previous assumptions. The majority of the sample enterprises selected in this article are manufacturing enterprises. Therefore, the occurrence of this result may be due to some companies having high debts or borrowing too many assets, which require interest repayment and generate interest expenses, resulting in fewer assets and more focus on debt repayment and company profits. Therefore, there is no extra time and cost to pursue a low-carbon economy, purchase low-carbon equipment, etc., and relevant carbon accounting information is rarely disclosed.

This paper revises the model results by White test and obtains the results in the table above. Table 7 shows that the P value of the model is 0.000000 and the F value is 47.835522. The correlation of the model has passed the F-test at the 5% confidence level, so the regression model can be accepted.

4) Regression Model Adjustment

Table 8. Regression analysis results after removing variables

Variable	Coefficient	Standard error	t-statistic	Probability
C	6.368655	0.403524	15.782607	0.000000
ROE	1.532643	0.556061	2.756251	0.006220
CAPABILITY	-1.532789	0.718349	-2.133765	0.033707
EPS	0.391838	0.164073	2.388194	0.017576
OW	0.676597	0.303607	2.228531	0.026617
IT	2.116026	0.147637	14.332588	0.000000
R-squared		0.498951		
Adjusted R-squared		0.490252		
Mean dependent var		7.704082		
S.D. dependent var		3.404101		
F-statistic		57.358861		
Prob(F-statistic)		0.000000		

After excluding the variable with significantly insignificant regression results - the company's listing years, this article regresses the remaining variables again and obtains the final result.

It can be seen from Table 8 that among the five explanatory variables passing the significance test, the net return on equity (ROE), basic earnings per share (EPS), state-owned holding enterprises (OW) and heavily polluting enterprises (IT) are all positively correlated with the level of carbon accounting information disclosure, and the impact direction is the same as the original hypothesis; The impact direction of enterprise asset liability ratio (CAPABILITY) is opposite to the original assumption. The specific conclusions are as follows:

1) There is a positive correlation between state-owned holding enterprises and the level of carbon accounting information disclosure, which is consistent with the original hypothesis. The carbon accounting information disclosure level of state-owned holding enterprises is higher than that of non-state-owned holding enterprises.

2) There is a positive correlation between heavily polluting enterprises and the level of carbon accounting information disclosure, which is consistent with the original hypothesis. The carbon accounting information disclosure level of heavily polluting enterprises is higher than that of non-heavily polluting enterprises.

3) The net return on equity of enterprises is positively correlated with the level of carbon accounting information disclosure, which is consistent with the original assumption. Enterprises with higher net return on equity are more willing to disclose carbon accounting information.

4) The asset liability ratio of enterprises is negatively correlated with the level of carbon accounting information disclosure, which is inconsistent with the original assumption. In theoretical analysis, there is a positive correlation between the asset liability ratio of enterprises and the level of carbon accounting information disclosure. Enterprises with higher asset liability ratios are more willing to disclose carbon accounting information. However, empirical analysis shows that companies with higher asset liability ratios are less willing to disclose carbon accounting information, which is contrary to the theoretical analysis conclusion. Therefore, the analysis of the reasons for this phenomenon is as follows: some manufacturing enterprises have high debts or borrowed too many assets, which require interest payments, resulting in less assets and having to focus more on debt repayment and company profits. Therefore, there is no extra time and cost to pursue a low-carbon economy, purchase low-carbon equipment, and rarely disclose relevant carbon accounting information.

5) The basic earnings per share of enterprises are positively correlated with the level of carbon accounting information disclosure, consistent with the original hypothesis. Enterprises with higher basic earnings per share are more willing to disclose carbon accounting information.

5. Conclusion and Suggestions

Based on the combination of theoretical analysis and empirical analysis, this paper deeply analyzes the main factors that affect the level of carbon accounting information disclosure of listed companies in China. It finds that the net return on equity of enterprises, the number of years of listing, the basic earnings per share of enterprises, state-owned holding enterprises, heavily polluting enterprises and the explained variables are positively correlated, while the solvency of enterprises is negatively correlated with the explained variables. Therefore, this article proposes some objective suggestions from three aspects: the country, society, and enterprises, hoping to help improve the level of carbon accounting information disclosure in China and promote the sustainable development of enterprises in the future.

5.1 At the National Level

In recent years, China has been emphasizing environmental protection, but the regulations related to environmental protection are very limited. Therefore, from a legal perspective, the disclosure of carbon accounting information is not an obligation that enterprises must fulfill. And companies that voluntarily disclose carbon accounting information also have different disclosure formats. Therefore, the country should formulate relatively complete rules and regulations, and the environmental protection department should also supervise major enterprises with due diligence and responsibility. For enterprises that have sound regulations and actively implement energy-saving and emission reduction measures, appropriate incentive measures can be taken to motivate other enterprises; For enterprises that have not yet established regulations and regulatory processes, corresponding punishment measures should be taken to promote the reasonable disclosure of carbon accounting information by major enterprises. The above measures are beneficial for helping to form a low-carbon economic management system and implementing differentiated management, achieving separation of powers and complementing each other among departments, and also conducive to the updating and progress of China's accounting system.

5.2 Social Level

The supervision of society and the masses is a powerful booster for enterprises to effectively disclose carbon accounting information, and can also raise awareness of low-carbon environmental protection and low-carbon economy among all sectors of society. It is now recognized that protecting

the environment is not only the responsibility of a small number of people, but also that everyone should pay attention to and be responsible for it, so as to more actively disclose carbon information.

For enterprises, all sectors of society are stakeholders, and they should take the initiative to disclose carbon accounting information, provide useful information for all sectors of society, and accept supervision from all sectors of society to prevent whitewashing of financial statements and improve the authenticity, accuracy, and image and reputation of the enterprise.

In addition, the effective disclosure of carbon accounting information can also enable all investors and customers of the enterprise to have a deeper understanding of the enterprise, which can help investors or customers make investment decisions to a certain extent, and thus choose whether to cooperate with the enterprise.

5.3 At the Enterprise Level

When searching for enterprise information, it was found that only a small number of enterprises have established a dedicated environmental protection department. Therefore, enterprises can establish a dedicated environmental protection department to supervise whether the enterprise has non-compliant carbon emissions or violated relevant environmental protection rules and regulations, strengthen accounting professional and timely training, improve internal control systems, and improve the accuracy and professionalism of audits, and actively undertake the task of energy conservation and emission reduction for enterprises, effectively cooperate with local environmental protection departments for supervision and inspection, and take timely measures for rectification.

In addition, leaders and employees of enterprises should have awareness of carbon information disclosure and the implementation of low-carbon environmental protection. Enterprises should pursue a low-carbon economy. Therefore, enterprises can develop carbon emission policies suitable for their own development based on their own needs and current situation, and provide timely training for enterprise employees to enhance their awareness of carbon information disclosure and environmental protection.

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