sustainability

MDPI

Article

Corporate Sustainable Growth, Carbon Performance, and Voluntary Carbon Information Disclosure: New Panel Data Evidence for Chinese Listed Companies

Erli Dan *, Jianfei Shen and Yiwei Guo

School of Economics and Management, North China Electric Power University, Beijing 102206, China
* Correspondence: erlidancris@ncepu.edu.cn

Abstract: At present, to comply with carbon reduction commitments, China has only required energy-intensive enterprises to report their carbon information to regulators, aside from mandatory public disclosures. Although some enterprises have been disclosing their own carbon information voluntarily by means of corporate reports in order to shape their green image, their carbon information disclosures (CID) still need to be improved. This study attempts to systematically investigate links between corporate growth, carbon emission (CEP) or reduction performance (CRP) in two forms (intensity and amount), and CID in industries with different carbon intensities on the basis of stakeholder theory as well as legitimacy theory. This study took Chinese companies listed on the main board market from 2009 to 2021 as samples. The Arellano–Bover/Blundell–Bond dynamic panel data model was used for regression analysis. Results showed that sustainable growth enhanced the promotion effect of CEP (both in terms of intensity and amount) on CID in carbon-intensive industries, while sustainable growth enhanced the inhibition effect of CEP measured in terms of amount, rather than intensity, on CID in low-carbon industries. This revealed that CEP, not CRP, had a significant influence on CID, and uncovered the influence mechanism between carbon performance and CID from the perspective of sustainable enterprise growth. The carbon information disclosure of high-carbon industries is closely and positively related to carbon performance, indicating that the interaction between high-carbon industries and capital markets will be more affected by the mitigation of carbon information asymmetry. Further, circulating A-shares are moderators for better CID in both carbon-intensive industries and low-carbon industries, which fits the expectation of stakeholder theory as well as legitimacy theory. Additionally, measurement habits or preference for carbon emissions performance (in the form of amount or intensity) in different industries should be brought to the forefront to enhance investors' confidence in CID. This study has certain guiding value for the formulation of CID standards and contributes to the process of mandatory CID.

Keywords: carbon information disclosure; carbon emission performance; carbon emission reduction performance; corporate sustainable growth; carbon-intensive industries; low-carbon industries

check for updates

Citation: Dan, E.; Shen, J.; Guo, Y. Corporate Sustainable Growth, Carbon Performance, and Voluntary Carbon Information Disclosure: New Panel Data Evidence for Chinese Listed Companies. *Sustainability* **2023**, *15*, 4612. https://doi.org/10.3390/su15054612

Academic Editors: Izabela Jonek-Kowalska and Lilla Knop

Received: 15 December 2022
Revised: 23 February 2023
Accepted: 24 February 2023
Published: 4 March 2023

1. Introduction

As climate change has become more and more serious, the goal of controlling global temperatures within 2 °C (compared with the pre-industrial age) promotes close and substantial cooperation within the international community to curb greenhouse gas emissions. Studies have shown that compensation policies and carbon market mechanisms contribute to carbon emission reduction [1,2]. For example, the number of participating companies has doubled, and the emission load of big emitters was adjusted down to half of the initial criterion determined in Beijing in 2016 [3]. The status quo of enterprise carbon emissions as well as carbon emission reduction efforts will be more and more important for the carbon predominance of enterprises in the era of carbon trading. Carbon emission reduction efforts and carbon performance are inseparable from internal development, such as enterprises' sustainable growth, and so on. Enterprises' sustainable growth may interact with the external environment when it comes to potential financing and information asymmetry from the perspective of stakeholders.

For carbon predominance, enterprises, the main body of greenhouse gas emissions, must attach importance to carbon information disclosure (presentation behavior) in order to maintain a green image. Carbon information disclosure is an important means for demonstrating the integrity, detail, and credibility of key carbon emissions data, including that of scope 1 and 2 emissions and carbon intensity, as well as data related to emission mitigation measures, to the government, the public, and investors [4,5]. Since investors and creditors' demand for high-quality carbon information is increasing in green finance, China's mainland bourses and the China Securities Regulatory Commission (CSRC) encourage enterprises to disclose carbon emission data. The content and format of Guideline No. 2—Corporate Information Disclosure of Publicly Issued Securities has been revised to ensure the indicative value of disclosure [6]. The Hong Kong Stock Exchange also increased the requirements for environmental, social, and governance (ESG) reports, issued via several pieces of guidance on climate disclosure reporting since 2016 [7]. Eighty-two listed companies in Hong Kong provided 224 carbon footprint reports between 2011–2017 [8].

However, enterprises tend to actively disclose favorable information related to carbon emission reduction in mainland China [9–14]. Since CID is not mandatory, and rules for CID are not well-established, relevant supervision and initiatives have played a limited role in Chinese companies [15]. After the government proposed its goals for carbon peak and carbon neutrality, the coming transition period before mandatory CID is implemented will be key for investigating the carbon behavior of Chinese companies from the perspective of the companies. In particular, stakeholders seem more concerned about the CIDs of enterprises from high-carbon industries than those of low-carbon industries. However, carbon predominance still exists in low-carbon industries in terms of intra-industry or inter-industry production. Considering stakeholders' concerns about corporate sustainable growth from the perspective of stakeholder theory, we took corporate sustainable growth as the internal driver for carbon information disclosure.

Therefore, these research questions are proposed: 1. Does carbon emission performance have different effects on carbon information disclosure in carbon-intensive industries compared to low-carbon industries? 2. Do the two aspects of carbon emission performance, measured via carbon emission and carbon emission reduction, affect carbon information disclosure in different directions? 3. Does corporate sustainable growth strengthen the relationship between carbon emission performance and carbon information disclosure?

This study collected carbon information from 2009–2021 social responsibility reports and ESG reports from A-share firms listed on the main board market. A set of corporate CID items was identified in the study. As the value and urgency of CIDs are obviously different in carbon-intensive industries versus low-carbon industries, we investigated whether the effects of two kinds of carbon performance, namely carbon emission performance and carbon emission reduction performance, on CID are consistent. As an important aspect of enterprise development, the sustainable growth of enterprises may drive carbon performance. This study further explores whether sustainable development has a moderating effect on the relationship between carbon emission performance or carbon emission reduction performance and CID. The Arellano–Bover/Blundell–Bond (A–B/B–B) estimation of dynamic panel data statistical method was adopted.

Investigating the voluntary CID of Chinese listed companies broadens the influencing factors (corporate sustainable growth) of the behavior of enterprises from industries with different carbon intensity characteristics and has not only enriched stakeholder theory and legitimacy theory, but has also been helpful in promoting the formulation of mandatory carbon information disclosure for the near future. In practice, carbon emission performance other than carbon emission reduction performance, measured in terms of both intensity and amount, of carbon-intensive industries should be emphasized continuously by government oversight as well as enterprises. While carbon emission performance measured via amount of carbon emissions has a significantly negative effect on CID in low-carbon industries, carbon information disclosure in high-carbon industries is closely and positively related to carbon performance, indicating that the interaction between high-carbon industries and capital markets will be more affected by the mitigation of carbon information asymmetry. Therefore, more refined and instructive measures of carbon performance should be proposed for industries with different carbon intensities, considering the opposite influences of carbon performance on CID in different industries. Further, tradable shares will help industries to promote their CIDs, which can be explained by legitimacy theory.

2. Literature Review and Hypothesis Development

2.1. Literature Review

Environmental performance, CSR measures (reputation ranking) and environmental disclosures, and even early investment in environmental responsibility positively affect stock prices and make enterprises appealing to investors and analysts [16–20]. ESG performance improves corporate credit ratings and is related negatively to risk-taking [21,22]. Further, environmental information disclosure (EID) has reduced corporate risk and promoted firm value through investor perceptions [23–31]. However, benefits from ESG disclosure seem to be more pronounced in less-developed districts [32,33]. This might be one factor that damages enterprises' enthusiasm for ESG disclosure.

From the perspective of financial performance, the positive effect of EGS, corporate environmental responsibility, or corporate sustainability performance and EID on firms' financial performance is also constantly significant [19,34–40]. Various and different connections between CSR and financial indicators exist in various samples [41,42]. Further, EID and mandatory CSR disclosure are positively correlated with enterprise innovation [43,44]. Both environmental performance and EID are related to corporate stock market performance, financial performance, and firm value, indicating that significant correlations between environmental performance and EID exist and supporting voluntary disclosure theory [21,28,45–48].

Especially as the global climate change situation has become aggravated, carbon performance as a component of environmental performance has become increasingly important. Similarly, carbon performance has been found to be correlated with firm value and financial performance in some high-carbon industries besides agriculture and the new energy industry [2,14,49–57]. However, Zhang also found that positive relationships between carbon and financial performance exist only when carbon performance is beyond a certain threshold [58].

The improvement of carbon performance is influenced by enterprise energy choice, abatement investment, and internal carbon management, including internal carbon pricing, corporate climate targets, establishing corporate GHG emission inventories, and so on [22,59,60]. From the perspective of corporate governance, managerial discretion has a positive effect on low-carbon performance [61,62]. These influencing factors, along with control tools and the adoption of a Carbon Management Strategy, also have a certain impact on carbon management and CID (for scope 1 and 2 emissions) [63–68].

Similar to carbon performance, CID is also significantly related to financial performance, (financial) risk, and value [50,69–76]. Investors are willing to acknowledge enterprises with better performance in GHG emissions and transparency regardless of lower returns [16]. Consistency in corporate carbon performance and CID also improve enterprise value in manufacturing industries [55]. However, carbon-intensive industries are inclined to avoid voluntary CID [77]. Research on CID also includes normative studies (methodological diversity and integrity of content) to maintain consistency and to reconcile the usefulness of climate change-related data [78–81].

From correlations between green performance and corresponding information disclosure [82] to the bridges between carbon performance and CID, such as enterprise value, financial performance, internal management (carbon management), investment, and low-carbon awareness among managers, these associations provide a strong basis for investing in improved carbon performance and CID [8,74,83–86]. However, investigations into the carbon performance and CID of enterprises are still under way because of uncertainty [87,88], which may indicate that industrial characteristics, enterprise characteristics such as growth, stock liquidity, and ownership concentration, as well as specific measurements for CID, also need to be investigated.

The connections between sustainable growth and carbon performance [89], environmental performance in step with sustainable growth [90–92], harmony between carbon performance and environmental performance, environmental performance, and CID, and thus the connections between all of these things and profitability, risk-taking, and innovation and sustainable growth [93–95], as well as CID, corporate value improved by carbon performance or CID, environmental policy uncertainty, and sustainable growth (or carbon performance or financial aspects) and disclosure [96], provide some new possibilities for understanding the relationship between sustainable growth and CID. Sustainable growth is of great value in reducing the ambiguity of the relationship between CEP (or CRP) and CID.

To sum up, studies on carbon performance and CID are generally one-sided, and there are not abundant studies investigating enterprises' sustainable growth. Research objectives usually focus on excellent enterprises such as the Standard & Poor's 500 and do not investigate enterprises with poor financial performance or those from low-carbon industries. Additionally, carbon performance is often single-faceted or carbon performance measurements are not uniform, which can be seen by referring to the explanatory variables in this paper. CID measurement methods should also be clarified [87]. From the perspective of voluntary CID, this study calculated the number of CID items and the CID score on the basis of CID items collected from corporate reports including ESG reports. Additionally, the relationships between performance, sustainable growth, and CID in carbon-intensive and low-carbon industries was systematically studied.

2.2. Hypothesis Development

Signaling theory and stakeholder theory predict that stakeholders concerned about climate change favor companies with more or valuable CIDs. Voluntary disclosure or CSR disclosure is also compatible with legitimacy theories [97,98]. Although heavy-polluting companies tend to garner negative reactions from investors, they are more inclined to disclose environmental information and their environmental information disclosure reduces stock price crash risk [99,100]. Enterprises in carbon-intensive industries exposed to regulatory climate risks have received more attention from regulators and should therefore disclose more environmental information [101–108]. Belkhir et al. found that changes in CID and carbon performance were going in the same direction [109]. Carbon performance positively affects carbon disclosure in companies in the industrial sector, consumer staples sector, consumer discretionary sector, and so on, according to CDP data [110].

Specifically, stakeholder theory explained why growth capacity strengthens the positive relationship between CEP and CID in carbon-intensive industries and legitimacy theory explained the positive relationship between CEP and CID observed via the ratio of tradable stocks from the perspective of the capital market in carbon-intensive industries. In terms of legitimacy theory, enterprises are subject to fewer disclosure rules. From the perspective of stakeholder theory, namely stakeholder's expectations and preference for growth as well as reduction of information asymmetry, sustainable growth may have a positive impact on carbon disclosure by improving carbon performance. See Figure 1.

Further, enterprises in high-carbon industries have more information to disclose in terms of carbon emission measurements, carbon management methods, and carbon emission reduction actions. Since enterprises classified as reporting enterprises for carbon emissions or big emitters in mainland China must report their emissions data, carbon quota, and other carbon information on a specific platform [111,112], it is easier for them to prepare carbon information reports that may not require a lot of extra investment or cost. To explain the positive impact on environmental performance and environmental information disclosure in addition to CEP, CRP, and CID for specific industries, hypothesis 1 is proposed.

H1. *Corporate carbon emission performance has a positive impact on CID in carbon-intensive industries.*

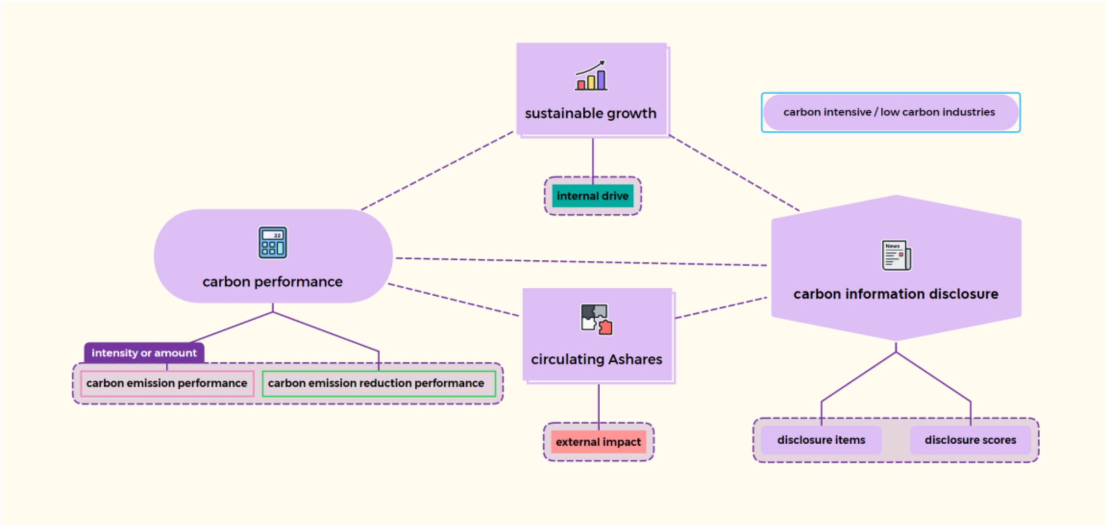

Figure 1. Research framework.

Although carbon-intensive enterprises emit more carbon dioxide, they also have greater carbon reduction potential. In addition, CRP is a representative of an enterprise's investment and innovation capacity, as well as its low-carbon business transfer plan. Disclosure and carbon-reduction efforts, such as the use of renewable energy, as well as carbon management, which is associated with stakeholder pressure, benefit CEP and CRP [59,87,113–116]. In summary, the theoretical expectation of stakeholders and the two intermediate variables of environmental information disclosure and carbon emission performance reflect the possible relationship between CRP and CID. Therefore, hypothesis 2 is proposed.

H2. *Corporate carbon emission reduction performance has a positive impact on CID in carbon-intensive industries.*

Companies with varied carbon intensities produced CIDS of significantly different quality [12,117]. Symbolic disclosure is more common in less intensive sectors [118] and can be explained by low pressure from the media and regulations, from an equilibrium perspective. Some firms remain silent and do not disclose environmental performance when they face diverse audiences [119], and studies show that carbon emission is positively correlated with CID [120]. In terms of legitimacy theory, enterprises are subject to fewer disclosure rules in low carbon industries. Therefore, hypotheses 3 and 4 are proposed.

H3. *Corporate carbon emission performance has a negative influence on CID in industries with low carbon intensity.*

H4. *Corporate carbon emission reduction performance has a negative influence on CID in industries with low carbon intensity.*

Higher sustainable ventures in growth will perform better in industries inclined to higher returns [121]. Models for growth potential and emissions were explored [90]. Green growth could improve corporate sustainability performance [91], and profitability and growth relationships are mediated via investment in China's manufacturing firms [95]. An association between R&D volatility or high innovation efficiency and firm growth exists [93,94], and EPU, economic policy uncertainty, is bound up with sustainable financial growth and carbon emission intensity as well as corporate risk-taking [122–124]. From the perspective of stakeholder theory, namely stakeholder's expectations and preference for growth, as well as for reductions in information asymmetry, sustainable growth may have a positive impact on carbon disclosure by promoting innovation, reducing risk-taking, or improving carbon performance. Therefore, combined with H1–H4, the following hypotheses are proposed.

H5. *The sustainable growth of enterprises enhances the promotion effect of carbon emission performance on corporate CID in carbon-intensive industries.*

H6. *The sustainable growth of enterprises enhances the promotion effect of carbon emission reduction performance on corporate CID in carbon-intensive industries.*

Growth rates in China's manufacturing industries negatively influence improvements in sustainable performance in production [89], and most of the manufacturing sector is low carbon intensity. That is, growth rates in low-carbon industries may negatively affect carbon performance. Moreover, a firm's growth rate is an important condition for disclosure [96]. Based on hypotheses 3 and 4, hypotheses 7 and 8 are proposed.

H7. *The sustainable growth of enterprises strengthens the inhibition effect of carbon emission performance on CID in low-carbon industries.*

H8. *The sustainable development of enterprises strengthens the inhibition effect of carbon emission reduction performance on CID in low-carbon industries.*

3. Research Design

3.1. Variables

The dependent variable is CID. CID refers to public disclosure of monetary, quantitative, or qualitative descriptions related to carbon emission, which is helpful for stakeholders in recognizing carbon performance. The quality of carbon information disclosure can be measured by the number of CID items. This study collects carbon information items from corporate social responsibility reports, sustainability reports, and environmental, social, and governance reports. In total, there were 62 items including carbon emissions, carbon emission reductions, identification of climate-related risks, emission reduction targets, carbon asset management, low-carbon transfer plans, low-carbon issues in the value chain, green and low-carbon office measures, and so on. Different types of carbon information items were distinguished and higher scores were assigned to the carbon information disclosure items that contain monetary or quantitative information. Those are the Scores of CID. More specifically, three points, two points, and one point were assigned for each monetary, quantitative, and qualitative carbon information disclosed, respectively. Number of CID items and Scores of CID (for the robustness test) were used as indicators to reflect the quality of CIDs in this study.

The explanatory variable of this study is carbon performance. Carbon performance refers to carbon emissions (reduction) or carbon intensity when applying low-carbon technologies, energy restructuring, relevant projects, carbon trading, and so on [125]. Carbon intensity is the ratio of carbon emissions (or emission reduction) and enterprise output value (or income). See Figure 2. Carbon emissions from Scope 1 and Scope 2, rather than Scope 3, are used in order to maintain consistency with the scope of carbon emissions disclosed by most enterprises and widely used disclosure guidelines regarding the difficulty of quantifying carbon emissions and reduction in Scope 3 emissions [109,126]. In detail, Scope 1 refers to the direct emissions generated by directly controlled or owned emission sources, including combustion, etc., and Scope 2 refers to indirect emissions, including the indirect emissions generated by power purchased for the enterprise's own use, such as steam, heating, cool air, etc. Scope 3 refers to indirect emissions other than those covered by Scope 2, including all emissions that may be produced upstream or downstream. Rather than the rate of change in carbon emissions, CRP refers to measurements based on carbon emission reduction from technology improvements, clean energy generation, etc.

Figure 2. Carbon performance indicators.

Good governance, including managerial ownership, is positively related to pollution disclosure, supporting legitimacy theory [127,128]. Additionally, cross listing is preferable to other types of listings in performance and fine environmental disclosure to mitigate the liability of foreignness [28,47,129]. This paper takes equity concentration to represent an aspect of corporate governance, then adds solvency, capital utilization as well as stock liquidity considering the financing method, financing demand, and information requirements [28,65,110], as shown in Table 1.

Table 1. Variable descriptions.

Variables	Proxy Variables	Symbolics	Explanations
CID	Number of CID items	CarboDisc	Nominal variables
Carbon Performance (CPerf)	Carbon Emission Intensity Performance	CPerf_E	Numerical variable
	Carbon Reduction Intensity Performance	CPerf_R	
Sustainable development	Sustainable growth rate	SusDeve	
Size	Asset	Asset	
	Liabilities	Liab	
Profitability (Profit)	Operating income	Sales	
	Return on total assets	ROA	
Solvency	Quick ratio	QuiRa	
Capital utilization	Fixed asset ratio	FiRa	
	Total asset turnover ratio	ToTuRa	
Equity concentration (EquityConcen)	Shareholding ratio (SR) of the first largest shareholder	ECSR1	
	SR of top 5 shareholders	ECSR5	
	SR of top 10 shareholders	ECSR10	
	Number of shareholders	EC11	
Stock liquidity (StockLiqu)	Shares that can be traded freely in RMB in the A-share market in Mainland China (Proportion of tradable A-shares)	TrdaSP	
	Shares listed in Hong Kong Stock Exchange (Proportion of tradable H-shares)	TrdhSP	

3.2. Empirical Models

Considering that there may be some continuity between corporate carbon information disclosure and previous disclosures, the study set regression models with a lag period on explained variables of four. In order to solve the endogeneity problem, the Arellano–

Bover/Blundell–Bond dynamic panel data model was used for regression analysis, and lags on the endogenous variables and the predetermined variables were used as instrumental variables. Considering data availability and matrix problems, the first-order, second-order, third-order, and fourth-order lag terms on the predetermined variables and endogenous variables were used as instrumental variables. If there are data matrix problems or high autocorrelation problems and collinearity problems, the number of lag terms on the dependent variables and the number of instrumental variables should be reduced accordingly.

The command line "xtset industry and year" was set in the statistical software, STATA, before the application of the Arellano–Bover/Blundell–Bond dynamic panel data model. The fixed effects of time and industry were automatically considered. As for the control of individual fixed effects, effective instrumental variables were included, namely the lag on the explanatory variables and the differential lag term. The Sargan test of overidentifying restrictions was used to verify the effectiveness of the instrumental variables to control for individual fixed effect.

Model 1:

$$\begin{aligned} CarboDisc_{i,t} = {} & \alpha + \alpha_1 CarboDisc_{i,t-1} + \alpha_2 CarboDisc_{i,t-2} \\ & + \alpha_3 CarboDisc_{i,t-3} + \alpha_4 CarboDisc_{i,t-4} + \alpha_5 CPerf_{i,t} \\ & + \alpha_6 Size_{i,t} + \alpha_7 Profit_{i,t} + \alpha_8 QuiRa_{i,t} + \alpha_9 FiRa_{i,t} \\ & + \alpha_{10} ToTuRa_{i,t} + \alpha_{11} EquityConcen_{i,t} + \alpha_{12} StockLiquu_{i,t} \\ & + \varepsilon \end{aligned}$$

Model 2:

$$\begin{aligned} CarboDisc_{i,t} = {} & \alpha + \alpha_1 CarboDisc_{i,t-1} + \alpha_2 CarboDisc_{i,t-2} \\ & + \alpha_3 CarboDisc_{i,t-3} \\ & + \alpha_4 CarboDisc_{i,t-4} \\ & + \alpha_5 CPerf_{E_{i,t}} + \alpha_6 SusDeve_{i,t} + \alpha_7 CPerf_{i,t} * SusDeve_{i,t} \\ & + \alpha_8 Size_{i,t} + \alpha_9 Profit_{i,t} + \alpha_{10} QuiRa_{i,t} + \alpha_{11} FiRa_{i,t} \\ & + \alpha_{12} ToTuRa_{i,t} + \alpha_{13} EquityConcen_{i,t} + \alpha_{14} StockLiqu_{i,t} \\ & + \varepsilon \end{aligned}$$

3.3. Sample Selection and Data Sources

Considering the specific platform access limits (only the government and companies themselves) on the corporate carbon data of China's big emitters and the lack of disclosure of China's listed companies by CDP [111,112,130,131], at present, CSR reports and ESG reports are still the main media and authoritative bases by which the public and investors can acquaint themselves with the carbon performance of enterprises in China. We selected enterprises listed on the main board market in China from 2009–2021 which published social responsibility reports and ESG reports as samples. Using these parameters, enterprise quantity reached 1229. This study also collected more than 3000 social responsibility reports and ESG reports from 37 industries. In this study, reports that disclosed corporate carbon emission or carbon emission reduction were selected as samples. If reports only contained non-numerical carbon information or carbon data that could not represent the overall carbon performance of an enterprise, they were not included in the sample. For example, if only the benefits of saving coal were disclosed, but corresponding carbon emission reductions were not disclosed, this was taken to indicate that the enterprise did not consider carbon data to be key to disclosure and we did not take them as samples. There were 481 valid observations in total. The valid number of enterprises was 91. The disclosure of CEP and CRP among China's A-share companies listed on the main board market is still very low.

Among the samples, carbon-intensive enterprises accounted for 37.36%, as shown in Table 2. Electricity and thermal power production and supply enterprises accounted for the highest proportion (15.38%). The percentage of computer, communications, and other electronics manufacturers in low-carbon industries was 9.89%.

Table 2. Sample distribution by industry.

CI Code	Sector	Frequency	Percent (%)	Cum. (%)
HCI1	Electricity, heat production, and supply industry	14	15.38	15.38
HCI2	Non-metallic products industry	6	6.59	21.98
HCI3	Coal mining and washing	4	4.40	26.37
HCI4	Chemical raw materials and chemical products manufacturing industry	4	4.40	30.77
HCI5	Smelting and pressing of non-ferrous metals	2	2.20	35.16
HCI6	Crude petroleum and natural gas industry	2	2.20	36.26
HCI7	Other high-carbon industries	2	2.20	47.25
LCI1	Manufacturing of computers, communications, and other electronic equipment	9	9.89	57.14
LCI2	Financial industry	9	9.89	62.64
LCI3	Manufacturers of general machinery	5	5.49	68.13
LCI4	Electrical machinery and equipment manufacturing	5	5.49	73.63
LCI5	Special equipment manufacturing	5	5.49	78.02
LCI6	Gas production and supply	4	4.40	82.42
LCI7	Pharmaceutical manufacturing industry	4	4.40	85.71
LCI8	Motor-car industry	3	3.30	89.01
LCI9	Non-ferrous metals mining and dressing	3	3.30	91.21
LCI10	Wine, beverage, and refined tea manufacturing	2	2.20	93.41
LCI11	Water production and supply	2	2.20	94.51
LCI12	Other low-carbon industries	6	6.59	100.00
	Total	91	100.00	

HCI and LCI represent carbon-intensive industries and low-carbon industries, respectively.

See Figure 3. Observations of CEP disclosures exceeded those of observations of CRP disclosures since 2017. Observations from carbon-intensive industries and low-carbon industries were 202 and 279, respectively.

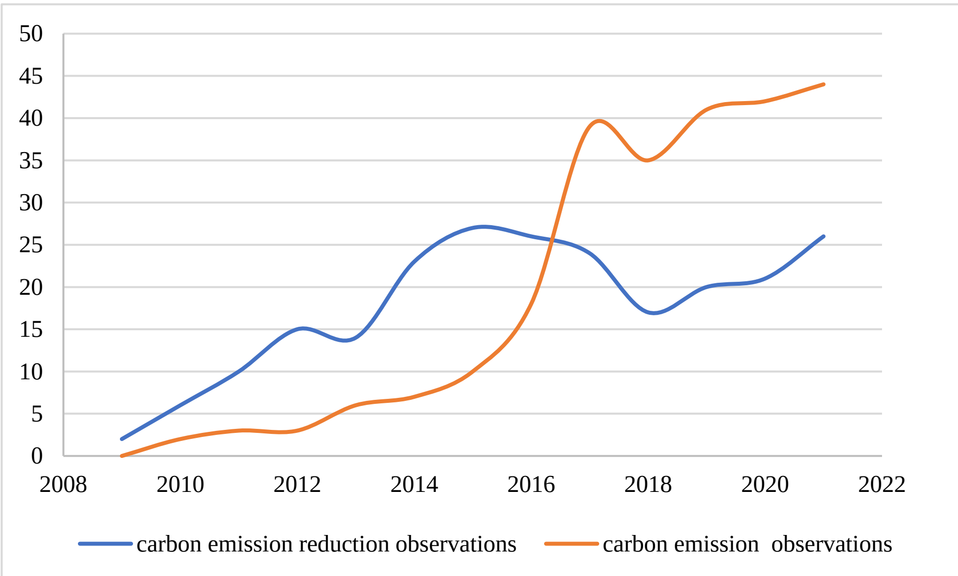

Figure 3. Observations information.

4. Empirical Results

4.1. Descriptive Statistics

STATA software was adopted to analyze statistics. Table 3 reports the key descriptive data of the sample. The mean of CID items was 8.366. Carbon emission and carbon emission reduction were 11.474 and 6.852, respectively.

Table 3. Descriptive analysis.

Variable	Obs.	Mean	Std. Dev.	Min	Max
CarboDisc	481	8.366	5.668	0	31
Carbon Emission	250	11.474	101.297	0	1147.752
Carbon Emission Reduction	231	6.852	10.588	0	46.049
SusDeve	481	0.077	0.105	−0.674	0.806
Asset (billion yuan)	481	736.348	342.010	1.819	30,253.981
Liab (billion yuan)	481	637.052	3133.085	0.501	27,639.859
Sales (billion yuan)	481	87.465	281.439	0.367	2966.193
ROA	481	0.043	0.049	−0.200	0.281
QuiRa	481	1.024	0.726	0.085	7.958
FiRa	481	0.303	0.211	0.001	0.876
ToTuRa	481	0.596	0.444	0.023	2.561
ECSR1	481	0.422	0.173	0.078	0.990
ECSR5	481	0.662	0.174	0.232	1.005
ECSR10	481	0.700	0.162	0.278	1.012
ECSR11	481	11.436	1.246	0.693	13.860
TrdaSP	481	0.997	2.989	0	66.274
TrdhSP	481	0.195	1.542	0	33.726

In terms of industries, petroleum processing, coking, and nuclear fuel processing, a carbon-intensive industry, disclosed 17 items, which is the most. Additionally, other low-carbon industries such as the metal products industry, food manufacturing, and wine, beverages, and refined tea manufacturing also disclosed more than others. The mean of CID items reported by the non-metallic mineral products industry was 4.632, which was the least. By year, the mean of CID items was the largest in 2021, as shown in Table 4, and CIDs show an increasing trend year on year.

This study constructed 62 items from the CID items on the basis of company standards for greenhouse gas emission agreement found in the Global Reporting Initiative, Guidelines for Writing Environmental Reports, and CDP questionnaire. Observations around five items were dense. See Figure 4. The fluctuation range of the CID items was 5.668 during 2009–2021.

4.2. Univariate Analysis

First, the maximum and minimum normalization method was used to process CarboDisc and CPerf_E (contrary indicator), while CPerf_R, Sales, Asset, Liab and EC 11 were processed via logarithm. CID had no significant correlation with carbon emission reduction or carbon emissions. Then, the data were winsorized. All coefficients are Pearson correlation coefficients. CID is significantly positively correlated with operating income, assets, liability, turnover, and equity concentration. CEP is significantly positively correlated with sustainable development, while CRP is significantly positively correlated with FiRa and equity concentration and negatively correlated with TrdaSP, as shown in Table 5.

Table 4. Panels for sector and year.

	HC1 (N = 95)	HC2 (N = 38)	HC3 (N = 19)	HC4 (N = 22)	LC1 (N = 53)	LC2 (N = 53)	LC3 (N = 21)	LC4 (N = 21)	LC5 (N = 14)	LC6 (N = 24)
Panel A										
CarboDisc	6.168	4.632	11.368	4.909	7.528	11.736	9.286	7.857	7.929	6.250
CPerf_E (ton/thousand yuan)	13.674	9.419	3.120	2.382	0.076	0.010	0.088	0.080	0.132	573.485
CPerf_R (ton/thousand yuan)	18.065	0.837	0.264	10.614	0.229	1.173	0.222	0.034	-	6.197
SusDeve	0.068	0.129	0.056	0.066	0.05	0.071	0.054	0.192	0.075	0.063
Asset	1220.712	549.391	3681.01	123.046	351.015	58,190.44	1164.516	1191.888	191.081	145.122
Liab	800.624	180.274	1397.538	35.097	214.262	53,069.42	786.961	814.699	102.845	80.441
Sales	303.801	360.107	1852.668	101.313	238.466	1631.334	521.308	1061.16	120.287	77.554
ROA	0.032	0.077	0.057	0.071	0.032	0.013	0.018	0.072	0.032	0.042
QuiRa	0.673	1.119	1.070	1.837	1.045	1.473	0.939	0.895	1.253	0.680
FiRa	0.556	0.447	0.387	0.333	0.213	0.005	0.132	0.11	0.181	0.390
ToTuRa	0.319	0.547	0.563	0.864	0.846	0.042	0.527	1.075	0.68	0.595
ECSR1	0.517	0.364	0.623	0.456	0.367	0.38	0.466	0.248	0.353	0.434
ECSR5	0.702	0.659	0.874	0.581	0.548	0.715	0.656	0.532	0.649	0.778
ECSR10	0.739	0.689	0.885	0.626	0.595	0.776	0.679	0.585	0.681	0.796
ECSR11	11.143	11.055	11.816	10.884	10.888	12.229	11.808	11.508	10.515	10.910
TrdaSP	0.954	0.834	0.785	1	0.928	0.669	0.796	4.008	0.758	0.971
TrdhSP	0.034	0.148	0.215	0	0.034	0.331	0.12	1.697	0.242	0.029
Panel B										
Variable	2021 (N = 70)	2020 (N = 63)	2019 (N = 61)	2018 (N = 52)	2017 (N = 63)	2016 (N = 44)	2015 (N = 37)	2014 (N = 30)	2013 (N = 20)	2012 (N = 18)
CarboDisc	14.086	10.81	9.213	7.904	7.048	6.114	5	5.5	5.6	4.833
CPerf_E (ton/thousand yuan)	1.744	2.249	2.680	3.730	31.509	65.276	0.869	1.338	1.873	2.868
CPerf_R (ton/thousand yuan)	5.638	6.556	6.911	9.168	6.793	10.464	6.128	5.452	6.530	5.255
SusDeve	0.086	0.07	0.074	0.088	0.081	0.055	0.053	0.071	0.091	0.064
Asset	13,248.55	13,628.16	12,707.62	4607.983	7286.227	2314.871	2270.546	2050.349	640.768	655.088
Liab	11,615.18	12,005	11,171.77	3790.145	6310.844	1860.731	1845.725	1657.593	322.311	334.161
Sales	1350.614	1186.695	1283.177	1128.498	932.083	389.369	323.302	334.065	305.654	286.357
ROA	0.054	0.042	0.043	0.045	0.042	0.038	0.03	0.037	0.043	0.038
QuiRa	1.07	1.012	1.087	1.18	1.058	1.079	0.842	1.172	0.762	0.756
FiRa	0.262	0.265	0.269	0.279	0.272	0.333	0.393	0.344	0.391	0.404
ToTuRa	0.679	0.568	0.618	0.643	0.56	0.537	0.489	0.55	0.6	0.557
ECSR1	0.398	0.407	0.408	0.411	0.401	0.419	0.45	0.454	0.477	0.486
ECSR5	0.659	0.687	0.682	0.679	0.661	0.632	0.644	0.639	0.643	0.656
ECSR10	0.697	0.729	0.721	0.721	0.706	0.675	0.677	0.665	0.668	0.692
ECSR11	11.797	11.57	11.492	11.47	11.542	11.43	11.472	10.876	11.219	11.285
TrdaSP	0.836	0.825	0.824	0.857	1.874	0.91	0.921	0.896	0.923	0.937
TrdhSP	0.154	0.174	0.175	0.141	0.69	0.086	0.065	0.05	0.056	0.033

Table 5. Correlations between variables.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1) CarboDisc	1.000																
(2) CPerf_E	0.083	1.000															
	(0.191)																
(3) CPerf_R	−0.089 (0.175)	-	1.000														
(4) SusDeve	−0.079	0.131 **	−0.005	1.000													
	(0.211)	(0.039)	(0.939)														
(5) Sales	0.433 ***	0.025	−0.109 *	−0.027	1.000												
	(0.000)	(0.695)	(0.098)	(0.665)													
(6) ROA	−0.005	−0.036	−0.044	0.617 ***	−0.011	1.000											
	(0.943)	(0.572)	(0.506)	(0.000)	(0.862)												
(7) Asset	0.278 ***	0.096	−0.054	0.031	0.308 ***	−0.166 ***	1.000										
	(0.000)	(0.131)	(0.413)	(0.628)	(0.000)	(0.009)											
(8) Liab	0.266 ***	0.098	−0.055	0.033	0.284 ***	−0.169 ***	1.000 ***	1.000									
	(0.000)	(0.121)	(0.404)	(0.606)	(0.000)	(0.007)	(0.000)										
(9) FiRa	−0.056	−0.579 ***	0.603 *	−0.126 **	0.065	0.173 ***	−0.260 ***	−0.265 ***	1.000								
	(0.376)	(0.000)	(0.000)	(0.047)	(0.304)	(0.006)	(0.000)	(0.000)									
(10) QuiRa	−0.060	0.117 *	−0.171 *	0.145 **	−0.131 **	0.437 ***	−0.007	−0.009	−0.308 ***	1.000							
	(0.344)	(0.066)	(0.009)	(0.022)	(0.039)	(0.000)	(0.915)	(0.891)	(0.000)								
(11) ToTuRa	0.185 ***	0.110 *	−0.460 *	0.241 ***	0.162 **	0.420 ***	−0.288 ***	−0.292 ***	0.238 ***	−0.150 **	1.000						
	(0.003)	(0.081)	(0.000)	(0.000)	(0.010)	(0.000)	(0.000)	(0.000)	(0.000)	(0.018)							
(12) EC 1	0.188 ***	0.091	0.415 *	0.024	0.175 ***	0.065	0.114 *	0.110 *	0.020	0.012	0.219 ***	1.000					
	(0.003)	(0.149)	(0.000)	(0.704)	(0.005)	(0.304)	(0.073)	(0.084)	(0.758)	(0.848)	(0.000)						
(13) EC 5	0.211 ***	−0.035	0.226 *	−0.037	0.223 ***	−0.063	0.224 ***	0.219 ***	0.028	−0.025	0.057	0.746 ***	1.000				
	(0.001)	(0.580)	(0.000)	(0.555)	(0.000)	(0.324)	(0.000)	(0.001)	(0.661)	(0.689)	(0.372)	(0.000)					
(14) EC 10	0.223 ***	−0.040	0.230 *	−0.041	0.227 ***	−0.085	0.248 ***	0.243 ***	0.009	−0.006	0.013	0.695 *	0.983 ***	1.000			
	(0.000)	(0.525)	(0.000)	(0.523)	(0.000)	(0.181)	(0.000)	(0.000)	(0.886)	(0.921)	(0.844)	(0.000)	(0.000)				
(15) EC 11	0.179 ***	−0.070	−0.023	−0.148 **	0.241 ***	−0.156 **	0.207 ***	0.201 ***	−0.012	−0.059	−0.308 ***	−0.437 ***	−0.273 ***	−0.255 ***	1.000		
	(0.005)	(0.268)	(0.728)	(0.019)	(0.000)	(0.014)	(0.001)	(0.001)	(0.850)	(0.356)	(0.000)	(0.000)	(0.000)	(0.000)			
(16) TrdaSP	−0.042	0.021	0.125 *	0.171 ***	−0.023	0.088	−0.039	−0.039	−0.013	−0.031	0.128 **	−0.022	0.005	0.006	−0.040	1.000	
	(0.508)	(0.741)	(0.057)	(0.007)	(0.713)	(0.166)	(0.535)	(0.543)	(0.832)	(0.627)	(0.043)	(0.723)	(0.934)	(0.919)	(0.527)		
(17) TrdhSP	−0.010	0.023	−0.176 *	0.175 ***	0.002	0.065	0.028	0.029	−0.034	−0.042	0.105 *	−0.013	0.062	0.063	−0.038	0.992 ***	1.000
	(0.880)	(0.715)	(0.007)	(0.005)	(0.980)	(0.309)	(0.657)	(0.651)	(0.592)	(0.509)	(0.096)	(0.836)	(0.331)	(0.318)	(0.549)	(0.000)	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

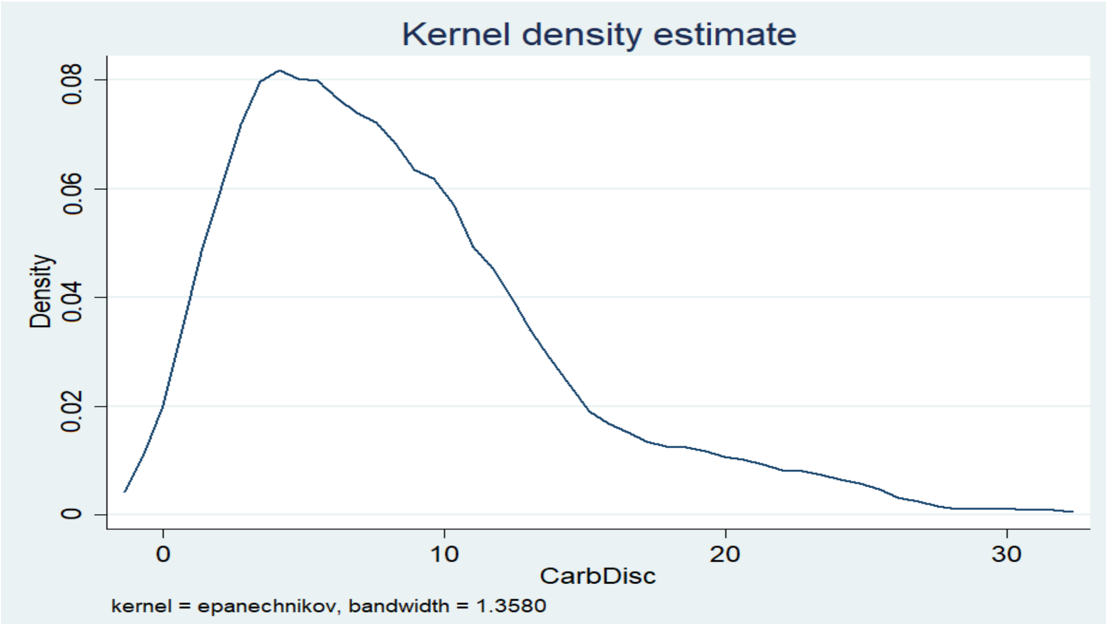

Figure 4. Kernel density estimate for carbon information disclosure.

4.3. Multivariate Analysis

Considering that there may be some continuity between indicators and their previous value, the study set regression models with a lag period on the variables. In order to solve the endogeneity problem, the Arellano–Bover/Blundell–Bond (A–B/B–B) estimation of dynamic panel data was used for regression analysis, and lags on endogenous variables and the predetermined variables were used as instrumental variables. The model includes four lags on the dependent variables. Equity concentration and tradable shares are predetermined variables, and the endogenous variables are carbon performance, operating income, assets, liabilities, ROA, solvency, FiRa, and ToTuRa.

For hypothesis 1, results show that the Wald chi2(11) = 3.06 $\times$ 10^6, Prob > chi2 = 0.0000, model is well established. The Arellano–Bond test for zero autocorrelation in first-differenced errors showed z = 1.498 (p = 0.1341) for Order 2, meaning there is no autocorrelation. The instrumental variables are shown in Table 6. The Sargan test of overidentifying restrictions showed chi2(44) = 18.877, p = 0.9997. The overidentifying restrictions were valid. The coefficient of CPerf_E was 15.601, which is significant at the level of 0.01. See Table 7. The better the carbon emission intensity performance of enterprises in carbon-intensive industries, the higher was the CID. Thus, hypothesis 1 was verified. However, hypothesis 2, hypothesis 3, and hypothesis 4 were not as predicted.

Table 6. Instrumental variables.

	Instruments for Differenced Equation	**Instruments for Level Equation**
GMM-type	L (2/5). CarboDisc L (1/4).EC1 L (1/4).EC5 L (1/4).EC10 L (1/4).EC11 L (1/4). TrdhSP L(2/4). CPerf L (2/4). FiRa L(2/4).QuiRa L(2/4).ToTuRa L(2/4).Sales L(2/4).Asset L(2/4).Liab L(2/4).ROA	LD. CarboDisc D.EC1 D.EC5 D.EC10 D.EC11 D.TrdhSP LD. CPerf LD. FiRa LD.QuiRa LD.ToTuRa LD.Sales LD.Asset LD.Liab LD.ROA
Standard	D. CPerf D.FiRa D.QuiRa D.ToTuRa D.Sales D.Asset D.Liab D.ROA D.EC1 D.EC5 D.EC10 D.EC11 D.TrdhSP	_cons

Table 7. Regression results.

	Model 1 (HC)	Model 1 (LC)	Model 1 (HC)	Model 1 (LC)
	CarboDisc_-CPerf_E		CarboDisc_-CPerf_R	
L	0.328 * (1.85)	0.141 (0.54)	0.555 ** (1.98)	0.581 ** (2.30)
L2	0.300 ** (2.20)	0.432 *** (4.09)	−0.327 ** (−2.08)	-
L3	-	0.001 (0.01)	0.239 (1.29)	-
L4	-	-	0.034 (0.18)	-
CPerf	15.601 *** (2.80)	−0.314 (−1.44)	−0.044 (−1.03)	0.001 (0.01)
FiRa	0.001 (0.34)	−0.001 (−0.43)	−0.002 *** (−3.39)	0.001 (0.82)
QuiRa	−0.005 (−0.15)	−0.014 (−0.24)	−0.028 (−1.37)	−0.029 (−0.85)
ToTuRa	0.098 (0.86)	0.064 (1.06)	0.026 (0.46)	0.006 (0.08)
Asset	0 *** (4.03)	0 ** (2.06)	0 (1.51)	0 *** (6.44)
Liab	0 *** (−2.62)	0 ** (−2.09)	0 (−1.6)	0 *** (−6.59)
ROA	0.002 (0.65)	−0.006 *** (−3.33)	0.008 *** (2.71)	−0.003 (−0.91)
Sales	0 (−0.36)	0 ** (2.14)	0 (−0.55)	0 (0.44)
EC1	−1.268 *** (−7.81)	0.145 (0.79)	−0.066 (−1.05)	0.273 ** (1.98)
EC5	0.155 (0.21)	0.651 (0.90)	−0.205 (−0.34)	1.001 *** (2.71)
EC10	0.638 (0.81)	−0.763 (−0.83)	0.335 (0.54)	−1.011 ** (−2.40)
EC11	0 (−0.01)	−0.039 (−0.72)	0.053 (1.50)	−0.043 ** (−2.06)
TrdaSP	0.008 *** (5.00)	-	0.008 (0.98)	0.003 * (1.91)
TrdhSP	-	0 (−0.01)	0.002 (0.19)	0.020 *** (5.13)
Constant	−16.114 *** (−2.72)	0.874 (1.20)	−1.251 (−1.35)	0.167 (0.60)
Number of obs	36	54	45	44
Number of instruments	60	76	76	71
Wald chi2	3.06×10^6 ***	600.815 ***	3819.721 ***	712,832.305 ***

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ HC and LC represent carbon-intensive industries and low-carbon industries, respectively.

The coefficient of interaction between carbon emission intensity performance and the sustainable growth of enterprises in carbon-intensive industries was 84.989, as shown in Table 8. Sustainable growth enhances the promotion of carbon emission intensity performance to the CID of enterprises in carbon-intensive industries. Hypothesis 5 was verified. However, sustainable growth enhances the inhibitory effect of carbon emission reduction intensity performance on the CID of carbon-intensive industries. Hypothesis 6 was not verified. In low-carbon industries, the coefficient of CPerf*SusDeve was not significant. Hypothesis 7 was not verified. The coefficient of CPerf*SusDeve was 1.614, which is significant at the 0.01 level, but CRP was still insignificant (compared with the results of the model with no interaction term), the results were not clear, and hypothesis 8 was not verified.

4.4. Robustness Checks

In this study, the robustness test was conducted by replacing the dependent variable with another proxy indicator. That is, the CID items were replaced by the CID score (CarboDisc_). Categories of carbon information items were distinguished, and CID items containing monetary or quantitative information were given higher scores, that is, each item of monetary, quantitative, and qualitative carbon information disclosed was awarded three points, two points, and one point, respectively. The carbon information items disclosed by enterprises were thus assigned and summed according to the corresponding coefficients to calculate the CID score.

Results showed that carbon emission intensity performance has a significantly positive effect on the CID score in carbon-intensive industries, as shown in Table 9. Sustainable growth enhances the promotion of carbon emission intensity performance to the CID of enterprises in carbon-intensive industries. Hypothesis 1 and hypothesis 5 were verified, while others have not been verified, which is consistent with the previous results. Other results can be seen in Table A1.

Table 8. Regression results of the moderating effect.

	Model 2 (HC)	Model 2 (LC)	Model 2 (HC)	Model 2 (LC)
	CarboDisc_-CPerf_E		CarboDisc_-CPerf_R	
L	0.320 ** (2.13)	0.153 (0.58)	0.590 ** (2.04)	0.525 ** (2.51)
L2	0.259 * (1.86)	0.386 *** (3.89)	−0.270 (−1.35)	-
L3	-	−0.008 (−0.09)	0.353 * (1.86)	-
L4	-	-	−0.025 (−0.13)	-
CPerf	12.501 ** (2.22)	0.010 (0.04)	−0.156 ** (−2.08)	−0.061 (−1.18)
SusDeve	−2.391 *** (−4.72)	−0.265 (−0.71)	−0.257 (−1.61)	−0.040 (−0.54)
CPerf*SusDeve	84.989 *** (4.94)	0.337 (0.32)	−0.850 * (−1.91)	1.614 *** (3.85)
FiRa	−0.001 (−0.8)	0 (0.14)	−0.002 ** (−2.52)	0.002 (1.58)
QuiRa	−0.008 (−0.28)	−0.006 (−0.10)	−0.012 (−0.46)	−0.030 (−1.17)
ToTuRa	0.097 (1.04)	0.064 (0.94)	−0.056 (−0.73)	−0.007 (−0.1)
Asset	0 *** (4.47)	0 ** (2.11)	0 (1.44)	0 *** (4.36)
Liab	0 *** (−3.88)	0 ** (−2.14)	0 (−0.90)	0 *** (−4.52)
ROA	0 (−0.04)	0.002 (0.24)	0.016 *** (2.59)	0 (−0.08)
Sales	0 (0.59)	0 ** (1.96)	0 (−0.65)	0 *** (3.13)
EC1	−1.102 *** (−6.46)	0.161 (0.85)	−0.099 (−1.59)	0.430 *** (2.8)
EC5	−0.108 (−0.22)	0.845 (1.32)	−0.041 (−0.06)	0.449 (1.32)
EC10	0.846 (1.56)	−0.942 (−1.12)	0.058 (0.08)	−0.585 (−1.52)
EC11	0.003 (0.11)	−0.020 (−0.39)	0.064 * (1.86)	−0.047 * (−1.92)
TrdaSP	0.008 *** (5.94)	-	0.012 (1.24)	0.004 ** (2.39)
TrdhSP	-	0 (0.29)	0.004 (0.42)	0.020 *** (6.27)
Constant	−12.554 ** (−2.14)	0.456 (0.69)	−1.513 (−1.43)	0.139 (0.52)
Number of obs	36	54	45	44
Number of instruments	60	80	76	71
Wald chi2	459.273 ***	2606.275 ***	3170.564 ***	5,213,984.419 ***

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 9. Regression results of carbon performance in the form of carbon intensity and CID scores in carbon-intensive industries.

	Model 1 (HC)	Model 2 (HC)
	CarboDisc_-CPerf_E	
L	0.481 *** (2.74)	0.425 *** (3.33)
L2	0.234 ** (2.50)	0.228 ** (2.04)
L3	-	-
L4	-	-
CPerf	14.917 *** (3.59)	11.463 ** (2.43)
SusDeve	-	−2.507 *** (−3.49)
CPerf*SusDeve	-	90.315 *** (3.72)
FiRa	0.001 (0.80)	−0.001 (−0.32)
QuiRa	−0.005 (−0.18)	−0.009 (−0.32)
ToTuRa	−0.041 (−0.43)	0.048 (0.62)
Asset	0 *** (−3.53)	0 *** (4.31)
Liab	0 *** (−3.37)	0 *** (−5.01)
ROA	0.002 (0.79)	−0.001 (−0.20)
Sales	0 (0.61)	0 * (1.86)
EC1	−1.381 *** (−8.59)	−1.225 ***−(8.79)
EC5	0.063 (0.08)	−0.209 (−0.38)
EC10	0.838 (1.06)	1.069 * (−1.79)
EC11	−0.014 (−0.53)	−0.008 (−0.33)
TrdaSP	0.008 *** (6.39)	0.009 *** (8.89)
TrdhSP	-	-
Constant	−15.374 *** (−3.51)	−11.447 ** (−2.41)
Number of obs	36	36
Number of instruments	60	60
Wald chi2	109,175.061 ***	15,939.747 ***

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

4.5. Further Investigation

The results show that relationship between carbon emission intensity performance and CID in carbon intensive industries meets expectations. The uncertainty about the relationship between carbon performance and the CID of enterprises in low-carbon industries may be due to the small amount of carbon emission and carbon emission reduction, which does not draw enough attention from the enterprises. In order to deeply analyze the effect of carbon performance on CID in carbon-intensive industries and low-carbon industries, this paper further adopts the substitution variable method, that is, carbon performance is replaced by carbon emission amount performance and carbon emission reduction amount performance, and then attempts further regression testing.

Further tests and corresponding robustness tests (see Tables 10 and 11) show that the carbon emission amount performance positively affects CID in carbon-intensive industries, and sustainable growth enhances the promotion effect of CPerf_EA on CID. CPerf_EA significantly (negatively) affects CID, and sustainable growth enhances the relationship between CPerf_EA and CID. Additionally, sustainable growth enhances the negative effect between CPerf_EA and CID. Hypothesis 1, hypothesis 5, and hypothesis 7 were thus verified. Other insignificant results can be seen in Tables A2 and A3.

Table 10. Regression results of carbon performance in form of carbon amount and CID.

	Model 1 (HC)	Model 1 (LC)	Model 2 (HC)	Model 2 (LC)	Model 2 (LC)
		CarboDisc_-CPerf_EA			**CarboDisc_ -CPerf_RA**
L	0.347 ** (2.15)	0.012 (0.05)	0.373 *** (2.59)	−0.021 (−0.09)	0.616 *** (3.25)
L2	0.358 ** (2.53)	0.472 *** (4.19)	0.286 * (1.91)	0.502 *** (4.58)	-
L3	-	0.089 (1.00)	-	0.058 (0.66)	-
L4	-	-	-	-	-
CPerfA	0.517 *** (3.80)	−7.657 *** (−4.13)	0.428 *** (2.95)	−12.667 *** (−3.37)	−7.400 *** (−3.43)
SusDeve	-	-	0.025 (0.17)	1.046 ** (2.04)	5.893 *** (3.61)
CPerfA*SusDeve	-	-	3.426 *** (4.81)	−53.346 ** (−2.25)	218.821 *** (3.73)
FiRa	0 (0.10)	−0.002 (−1.08)	−0.002 (−1.00)	−0.001 (−0.65)	0.004 ** (2.10)
QuiRa	0.001 (0.02)	−0.061 (−1.25)	0.022 (1.17)	0.012 (0.20)	−0.009 (−0.29)
ToTuRa	0.215 ** (2.07)	−0.113 ** (−2.12)	0.189 ** (2.13)	−0.086 (−1.39)	0.008 (0.26)
Asset	0 *** (4.12)	0 * (1.73)	0 *** (3.96)	0 * (1.65)	0 (1.11)
Liab	0 *** (−2.95)	0 * (−1.78)	0 *** (−4.88)	0 * (−1.69)	0 (−1.14)
ROA	0.002 (0.59)	−0.002 (−0.69)	−0.001 (−0.43)	−0.009 (−1.09)	−0.004 (−1.56)
Sales	0 (−0.43)	0 *** (2.91)	0 (0.35)	0 *** (3.21)	0 *** (2.70)
EC1	−1.187 *** (−6.21)	0.387 ** (1.98)	−1.222 *** (−4.58)	0.331 (1.63)	0.355 *** (2.79)
EC5	−0.616 (−0.81)	0.612 (0.95)	−0.217 (−0.45)	0.673 (1.21)	1.190 *** (3.51)
EC10	−1.369 (−1.52)	−1.112 (−1.36)	1.082 ** (1.98)	−1.126 * (−1.85)	−1.438 *** (−3.19)
EC11	−0.011 (−0.43)	−0.089 * (−1.94)	0.002 (0.08)	−0.104 ** (−2.03)	−0.030 (−1.28)
TrdaSP	0.006 *** (4.50)	−0.002 (−1.40)	0.008 *** (4.67)	-	0.003 ** (2.1)
TrdhSP	-	−0.002 (−1.40)	-	−0.002 (−1.49)	0.015*** (3.24)
Constant	−0.966 ** (−2.03)	9.191 *** (3.79)	−1.134 *** (−2.61)	13.603 *** (3.41)	−3.296 *** (−3.57)
Number of obs	36	54	36	54	44
Numberof instruments	60	76	60	80	71
Wald chi2	701.045 ***	9965.622 ***	937.624 ***	3095.462 ***	4,106,394.440 ***

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 11. Robust results of carbon emission performance in the form of amount and CID.

	Model 1 (HC)	Model 1 (LC)	Model 2 (HC)	Model 2 (LC)
		CarboDisc_-CPerf_EA		
L	0.478 *** (3.05)	−0.025 (−0.11)	0.474 *** (3.80)	−0.082 (−0.45)
L2	0.323 *** (2.64)	0.554 *** (6.22)	0.264 ** (2.01)	0.615 *** (9.01)
L3	-	0.090 (0.64)	-	−0.017 (−0.14)
CPerfA	0.569 *** (4.46)	−7.235 *** (−3.50)	0.462 *** (3.37)	−16.645 *** (−5.25)
SusDeve	-	-	0.061 (0.45)	1.851 *** (4.41)
CPerfA*SusDeve	-	-	3.565 *** (4.26)	−92.801 *** (−5.00)
FiRa	0.001 (0.63)	−0.001 (−0.65)	−0.001 (−0.35)	−0.001 (−0.50)
QuiRa	0.004 (0.15)	−0.074 (−1.54)	0.026 (1.30)	0.022 (0.37)
ToTuRa	0.159 * (1.82)	−0.121 * (−1.68)	0.133 ** (2.02)	−0.100 (−1.43)
Asset	0 *** (4.62)	0 (1.49)	0 *** (4.92)	0 (1.30)
Liab	0 *** (−3.88)	0 (−1.53)	0 *** (−6.48)	0 (−1.33)
ROA	0.003 (0.75)	0 (0.02)	−0.002 (−0.62)	−0.012 (−1.49)
Sales	0 (0.26)	0 *** (2.71)	0 (1.37)	0 *** (3.57)
EC1	−1.374 *** (−8.35)	0.222 (1.31)	−1.415 *** (−5.63)	0.179 (0.92)
EC5	−0.766 (−0.96)	0.174 (0.25)	−0.323 (−0.69)	0.181 (0.35)
EC10	1.683 * (1.89)	−0.540 (−0.63)	1.361 *** (2.58)	−0.521 (−0.96)
EC11	−0.024 (−1.08)	−0.108 * (−1.86)	−0.008 (−0.34)	−0.140 ** (−2.43)
TrdaSP	0.007 *** (7.24)	-	0.009 *** (6.47)	-
H	-	−0.002 (−1.32)	-	−0.003 * (−1.87)
Constant	−1.020 *** (−2.91)	8.947 *** (3.20)	−1.211 *** (−3.99)	17.454 *** (4.93)
Number of obs	36	54	36	54
Number of instruments	60	76	60	80
Wald chi2	34,101.256 ***	45,207.295 ***	721.076 ***	16,428.888 ***

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

To sum up, the better the carbon emissions performance (both in terms of measurement of the intensity and amount), the more carbon information is disclosed. Sustainable growth has enhanced the promotion effect of CEP on CID of enterprises in carbon-intensive industries. In low-carbon industries, the better the CEP measured via amount, the less was the CID. Moreover, sustainable growth enhances the inhibitory effect of CEP measured via amount on CID.

4.6. Other Tests

It can be expected from the above results that circulating A-shares may have a certain impact on carbon performance and CID. Further, circulating A-shares were treated as a new moderating variable. The results, including robustness tests, showed that circulating A-shares enhanced the promotion effect of carbon emission intensity performance on CID of enterprises in carbon intensive industries, while circulating A-shares weakened the inhibition effect of carbon emission intensity performance on CID in low-carbon industries. That is, circulating A-shares contribute to CID, which may verify that the financing needs (or emphasis) of enterprises in the stock market play a positive role in the corporate CID (Table 12).

Table 12. Regression results of carbon emission intensity performance, circulating A-shares, and CID.

	HC (Carbon-Intensive Industries)	LC (Low Carbon Industries)
	CarboDisc_-CPerf_E	
L	0.305 * (1.76)	−0.033 (−0.13)
L2	0.200 (1.22)	0.322 *** (3.25)
L3	-	0.061 (0.55)
CPerf_E	23.456 *** (3.15)	−0.657 ** (−2.31)
TrdaSP	−0.023 (−1.60)	-
CPerf_E*TrdaSP	0.897 ** (2.09)	0.057 *** (2.90)
FiRa	0.001 (0.66)	0.006 (1.43)
QuiRa	0.006 (0.15)	0.082 (1.22)
ToTuRa	−0.093 (−0.51)	−0.064 (−0.91)
Asset	0 (0.84)	0 ** (2.32)
Liab	0 (−1.01)	0 ** (−2.38)
ROA	0.003 (0.97)	−0.004 (−1.41)
Sales	0 (1.20)	0 *** (2.78)
EC1	−0.713 ** (−2.17)	0.357 * (1.93)
EC5	−0.050 (−0.08)	0.724 (1.07)
EC10	0.442 (0.66)	−0.784 (−0.92)
EC11	0.005 (0.14)	−0.037 (−0.95)
TrdhSP	-	0.001 (0.35)
Constant	−21.300 *** (−3.14)	0.987 (1.33)
Number of obs	36	54
Number of instruments	60	78
Wald chi2	1401.547 ***	2360.559 ***

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

5. Discussion and Conclusions

Taking A-share companies listed on the main board market as research objects, this paper explores the effects of corporate carbon performance, sustainable growth, industrial carbon intensity, and stock characteristics on corporate carbon information disclosure. Dynamic panel data models were established. Carbon emission performance both measured via intensity performance and amount performance has positive effects on carbon information disclosure, while carbon emission performance only measured via amount performance has the opposite effect. From the perspective of carbon-intensive industries, the essence of increasing carbon information disclosure is the improvement of carbon emission performance, which indicates that the interaction between high-carbon industries and capital markets will be more affected by the mitigation of carbon information asymmetry. The improvement of enterprises' carbon emission performance in carbon-intensive industries verifies the positive effect of enterprises' financing demand (or emphasis) in the stock market on enterprises' carbon information disclosure. Carbon information disclosure in carbon-intensive industries can be well explained by legitimacy theory and shareholder theory. However, carbon emission performance measured only via amount performance's inhibitory effect on carbon information disclosure in low-carbon industries may be related to corporate risk aversion to uncertainty. Namely, carbon information disclosure is more of a hindrance than a help to stock funding for low-carbon industries, or low-carbon industries have less of a preference for equity financing.

The potential reasons for the insignificant impact of carbon emission reduction performance on carbon information disclosure may be related to the fact that carbon emission reduction performance has not become the mainstream or the main carbon performance measurement index, or it may be the lack of consistency and comparability in carbon emission reduction data. As the task for carbon emission performance accounting and supervision is gradually carried out, corporate carbon emissions management has become overwhelming. Carbon emission reduction performance is somewhat not as important as carbon emission performance.

This study adds and verifies a new important factor in the framework of carbon information disclosure—sustainable growth. Sustainable growth negatively affects carbon information disclosure in carbon-intensive industries, while has a positive impact on carbon information disclosure in low-carbon industries. From the perspective of sustainable growth, carbon-intensive industries have conservative carbon information disclosure, while low carbon industries have aggressive carbon information disclosure.

Further, the results showed a synergistic effect between carbon emission performance (both in terms of intensity performance and amount performance) and sustainable growth on carbon information disclosure in carbon-intensive industries. There is a synergistic effect between carbon emission performance (amount performance rather than intensity performance) and sustainable growth on the carbon information disclosure of enterprises in low-carbon industries. Therefore, enterprise growth may be one factor in the internal driving force for carbon information disclosure. From another perspective, carbon emission performance has weakened the effect of sustainable growth on carbon information disclosure in both carbon-intensive industries and low-carbon industries. This shows the dominance of carbon emission performance on carbon information disclosure.

Based on a consideration of the capital market, carbon information disclosure not only reflects the legitimacy of enterprises, but may also be related to financing constraints. These lead to differences between carbon information disclosure in carbon-intensive industries and carbon disclosure in low-carbon industries. Further tests show that the circulation of A-shares contributes to the carbon information disclosure of enterprises in both carbon-intensive and other industries. This also verifies the positive effect of financing needs (or emphasis) on the carbon information disclosure of enterprises listed in the stock market.

However, this study has some limitations. This study adopts equity concentration to measure corporate governance. However, considering the importance of management in carbon information disclosure decisions, future studies need to add more indicators of corporate governance. In this paper, solvency, capital utilization, and tradable share ratio are included to reflect the financing method and its demand for carbon information. However, research on the role of the asset–liability ratio and debt cost seems obscure. In this way, improving carbon emission performance by consolidating the value of carbon information disclosure in reducing financing costs and financing restrictions will be helpful to explain corporate carbon information disclosure behavior. The potential mechanisms behind the relationship between sustainable growth and carbon information disclosure should include analysts' reporting and predictions as well as firms' share prices from the perspective of investors and firms.

With the gradual openness to corporate greenhouse gas reports in China, the future research direction for carbon information disclosure as well as carbon performance will involve the necessity and informative contents of mandatory carbon information disclosure. Under the uniform disclosure format, the contents of enterprise carbon information disclosure are highly similar, which means that dependent variables, such as carbon information disclosure, commonly used in previous research may be studied as control variables. In addition, ownership concentration or stock liquidity is significantly different in the influence mechanisms of the two types of carbon performance and carbon information disclosure. Further exploration of the reasons leading to these differences is conducive to gaining an in-depth understanding of corporate carbon information disclosure behaviors.

Author Contributions: Conceptualization, E.D. and J.S.; Methodology, E.D.; Software, E.D., J.S. and Y.G.; Validation, J.S.; Formal analysis, E.D.; Resources, Y.G.; Writing—original draft, E.D.; Writing—review & editing, J.S. and Y.G.; Supervision, J.S. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the Chinese National Funding of Social Sciences (Project No. 19BGL011).

Data Availability Statement: Financial data are from RESSET database: https://db.resset.com/common/main.jsp (accessed on 15 December 2022).

Acknowledgments: We gratefully acknowledge constructive suggestions and comments by Jianfei Shen and acknowledge financial support from the Chinese National Funding of Social Sciences (Project No. 19BGL011).

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

Appendix A

Table A1. Regression results of carbon performance in form of intensity and CID scores.

	Model 1 (LC)	Model 1 (HC)	Model 2 (LC)	Model 2 (HC)
	CarboDisc_-CPerf_E	**CarboDisc_-CPerf_R**	**CarboDisc-CPerf_E**	**CarboDisc-CPerf_R**
L	0.111 (0.44)	0.067 (0.29)	0.088 (0.37)	0.091 (0.42)
L2	0.566 *** (6.51)	−0.247 *** (−4.54)	0.534 *** (6.59)	−0.231 *** (−3.36)
L3	0.003 (0.02)	0.403 (1.59)	0 (−0.00)	0.484 * (1.85)
L4	-	0.247 (1.57)	-	0.17 (1.01)
CPerf	−0.146 (−0.56)	00	−0.074 (−0.30)	−0.087 (−1.44)
SusDeve	-	-	−0.209 (−0.60)	−0.122 (−0.96)
CPerf*SusDeve	-	-	−0.779 (−0.63)	−0.700 * (−1.76)
FiRa	0.001 (0.14)	−0.002 *** (−4.01)	0.001 (0.31)	−0.002 *** (−2.64)
QuiRa	−0.012 (−0.22)	−0.032 *** (−3.09)	0.004 (0.07)	−0.026 ** (−2.13)
ToTuRa	0.037 (0.46)	0.038 (0.96)	0.044 (0.58)	−0.003 (−0.05)
Asset	0 * (1.72)	0 (−0.27)	0 * (1.79)	0 (−0.50)
Liab	0 * (−1.74)	0 (0.20)	0 * (−1.82)	0 (0.53)
ROA	−0.004 * (−1.81)	0.006 *** (2.90)	−0.002 (−0.20)	0.01 ** (2.43)
Sales	0 * (1.94)	0 * (1.76)	0 ** (2.06)	0 * (1.95)
EC1	−0.031 (−0.19)	−0.02 (−0.34)	0.003 (0.02)	−0.038 (−0.57)
EC5	0.338 (0.45)	−0.467 ** (−2.25)	0.235 (0.37)	−0.467 * (−1.88)
EC10	−0.389 (−0.41)	0.511 *** (2.81)	−0.213 (−0.25)	0.422 * (1.75)
EC11	−0.061 (−0.97)	0.04 ** (2.31)	−0.053 (−0.88)	0.054 *** (2.82)
TrdaSP	-omited due to collinearity	−0.005 (−0.69)	-omited due to collinearity	−0.002 (−0.25)
TrdhSP	0 (−0.24)	−0.009 (−1.32)	0 (0.11)	−0.008 (−0.99)
Constant	0.963 (1.25)	0.172 (0.21)	0.822 (1.12)	−0.152 (−0.17)
Mean (dep var)	0.478	0.133	0.478	0.133
SD (dep var)	0.189	0.104	0.189	0.104
Number of obs	54	45	54	45
Number of instruments	76	76	80	76
Wald chi2	816.183 ***	1296.134 ***	2171.390 ***	32,420.282 ***
AB test for ZA	Order (2) = 1.333, $p = 0.182$	Order (2) = −0.876, $p = 0.381$	Order (2) = 1.427, $p = 0.154$	Order (2) = −1.069, $p = 0.285$
Sargan test of OVERID	chi2 (59) = 32.118, $p = 0.9983$	chi2 (57) = 26.671, $p = 0.9998$	chi2 (61) = 27.894, $p = 0.9999$	chi2 (55) = 23.376, $p = 0.9999$

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A2. Regression results of carbon performance in form of amount and CID.

	Model 1 (HC)	**Model 1 (LC)**	**Model 2 (HC)**
		CarboDisc_-CPerf_RA	
L	0.515 * (1.83)	0.582 *** (2.64)	0.524 * (1.66)
L2	−0.301 ** (−1.97)	-	−0.298 (−1.61)
L3	0.242 (1.34)	-	0.245 (1.28)
L4	0.064 (0.32)	-	0.061 (0.29)
CPerfA	0.048 (1.57)	−0.109 (−0.31)	0.038 (0.38)
SusDeve	-	-	−0.036 (−0.13)
CPerfA*SusDeve	-	-	0.067 (0.05)
FiRa	−0.002 *** (−3.25)	0.001 (0.77)	−0.003 *** (−3.24)
QuiRa	−0.028 (−1.31)	−0.028 (−0.84)	−0.027 (−1.03)
ToTuRa	0.033 (0.49)	0.01 (0.17)	0.027 (0.32)
Asset	0 * (1.65)	0 * (1.74)	0 (1.33)
Liab	0 * (−1.79)	0 * (−1.79)	0 (−1.00)
ROA	0.007 *** (2.97)	−0.003 (−0.92)	0.008 (0.75)
Sales	0 (−0.22)	0 (−0.07)	0 (−0.22)
EC1	−0.064 (−0.77)	0.275 ** (1.98)	−0.068 (−0.84)
EC5	0.034 (0.05)	1.021 ** (2.41)	0.022 (0.03)
EC10	0.119 (0.19)	−1.038 ** (−2.05)	0.133 (0.22)
EC11	0.043 (1.23)	−0.045* (−1.91)	0.044 (1.32)
TrdaSP	0.007 (1.05)	0.004 ** (2.36)	0.007 (0.98)
TrdhSP	0.001 (0.21)	0.020 *** (4.32)	0.002 (0.24)
Constant	−1.038 (−1.33)	0.16 (0.60)	−1.071 (−1.41)
Mean (dep var)	0.168	0.172	0.168
SD (dep var)	0.137	0.178	0.137
Number of obs	45	44	45
Number of instruments	76	71	76
Wald chi2	4195.857 ***	716,948.590 ***	943.905 ***
AB test for ZA	Order (2) = −0.444, p = 0.657	Order (2) = 1.405, p = 0.160	Order (2) = −0.382, p = 0.702
Sargan test of OVERID	chi2 (57) = 28.625, p = 0.9994	chi2 (55) = 24.513, p = 0.9999	chi2 (55) = 23.830, p = 0.9999

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A3. Robust results of carbon performance in the form of amount and CID.

	Model 1 (HC)	Model 2 (HC)
	CarboDisc_-CPerf_RA	
L	0.0010	−0.058 (−0.26)
L2	−0.215 *** (−3.39)	−0.203 ** (−2.26)
L3	0.399 (1.61)	0.387 (1.45)
L4	0.291 (1.57)	0.307 (1.56)
CPerfA	0.074 (1.37)	0.117 (0.95)
SusDeve	-	0.152 (0.54)
CPerfA*SusDeve	-	−0.353 (−0.46)
FiRa	−0.002 *** (−3.30)	−0.002 *** (−3.41)
QuiRa	−0.029 *** (−2.81)	−0.033 ** (−2.62)
ToTuRa	0.032 (0.68)	0.055 (0.83)
Asset	0 (−0.87)	0 (−0.81)
Liab	0 (0.26)	0 (0.02)
ROA	0.006 *** (2.90)	0 (0.04)
Sales	0 *** (2.84)	0 *** (3.13)
EC1	−0.026 (−0.41)	−0.007 (−0.10)
EC5	−0.177 (−0.82)	−0.071 (−0.20)
EC10	0.226 (1.06)	0.10 (0.28)
EC11	0.034 ** (2.43)	0.028 * (1.84)
TrdaSP	−0.006 (−0.85)	−0.008 (−1.36)
H	−0.01 (−1.46)	−0.011 ** (−2.08)
Constant	0.301 (0.42)	0.543 (0.88)
Mean (dep var)	0.133	0.133
SD (dep var)	0.104	0.104
Number of obs	45	45
Number of instruments	76	76
Wald chi2	3198.921 ***	7086.540 ***
AB test for ZA	Order (2) = −0.889, $p = 0.374$	Order (2) = −1.042, $p = 0.297$
Sargan test of OVERID	chi2 (57) = 26.931, $p = 0.9998$	chi2 (55) = 22.416, $p = 1.0000$

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

References

1. Haque, F. The Effects of Board Characteristics and Sustainable Compensation Policy on Carbon Performance of UK Firms. *Br. Account. Rev.* **2017**, *49*, 347–364. [CrossRef]
2. Yang, J. China's development status, problems and countermeasures of carbon trading market. *Enterp. Econ.* **2018**, *37*, 29–34. [CrossRef]
3. Beijing Development and Reform Committee. Available online: http://fgw.beijing.gov.cn/gzdt/tztg/202004/P020200417617043557695.pdf (accessed on 10 February 2023).
4. Zhang, C.; Xiao, X. The System of Corporate Carbon Performance Indicators. *Syst. Eng.* **2011**, *29*, 71–77.
5. HKEX. Available online: https://www.hkex.com.hk/-/media/hkex-market/listing/rules-and-guidance/listing-rules-contingency/main-board-listing-rules/appendices/appendix_27 (accessed on 10 February 2023).
6. Shanghai Stock Exchange. 2021. Available online: http://www.sse.com.cn/lawandrules/regulations/csrcannoun/c/5533573.pdf (accessed on 10 February 2023).

7. HKEX. Available online: https://www.hkex.com.hk/-/media/HKEX-Market/Listing/Rules-and-Guidance/Environmental-Social-and-Governance/Exchanges-guidance-materials-on-ESG/guidance_climate_disclosures_c.pdf?la=zh-HK (accessed on 10 February 2023).
8. Carbon Footprint Repository for Listed Companies in Hong Kong. Available online: http://www.carbon-footprint.hk/zh-hant/node/128# (accessed on 10 February 2023).
9. Du, X.; Zhang, H. Relationship of Institution Investors, Carbon Disclosure and Equity Capital Cost. *J. Xi'an Shiyou Univ. Soc. Sci.* **2018**, *27*, 47–53. [CrossRef]
10. Yan, H.; Jiang, J.; Wu, Q. The Effects of Carbon Performance on Financial Performance from the Perspective of Ownership Type. *J. Appl. Stat. Manag.* **2019**, *38*, 94–104. [CrossRef]
11. Yuan, J.; Zhang, L. An empirical study on the impact of carbon information disclosure on the financing constraints of listed companies—Based on the empirical evidence of resource-based enterprises. *Ecol. Econ.* **2017**, *33*, 42–47.
12. Zhang, Y.; Zhang, H. Study on carbon information disclosure of listed companies of heavy polluting industries—based on social responsibility report of heavy polluting enterprises listed in Shanghai Stock Exchange. *Commer. Account.* **2016**, *24*, 29–32. [CrossRef]
13. Zheng, W.; Song, C.; Zhang, L.; Xu, M. Research on Carbon Information Disclosure Evaluation of Chinese listed Companies based on AHP and entropy weight comprehensive model. *Financ. Res.* **2017**, *6*, 53–61. [CrossRef]
14. Zhou, Z.; Xiao, T.; Zeng, H. Relationship between Corporate Carbon Performance and Corporate Financial Performance: Evidence from FTSE 350. *J. China Univ. Geosci. Soc. Sci. Ed.* **2017**, *17*, 32–43. [CrossRef]
15. Bingler, J.A.; Kraus, M.; Leippold, M.; Webersinke, N. Cheap Talk and Cherry-Picking: What ClimateBert Has to Say on Corporate Climate Risk Disclosures. *Financ. Res. Lett.* **2022**, *47*, 102776. [CrossRef]
16. Alessi, L.; Ossola, E.; Panzica, R. What Greenium Matters in the Stock Market? The Role of Greenhouse Gas Emissions and Environmental Disclosures. *J. Financ. Stab.* **2021**, *54*, 100869. [CrossRef]
17. Bernardi, C.; Stark, A.W. On the Value Relevance of Information on Environmental and Social Activities and Performance—Some Evidence from the UK Stock Market. *J. Account. Public Policy* **2018**, *37*, 282–299. [CrossRef]
18. Castro, P.; Gutiérrez-López, C.; Tascón, M.T.; Castaño, F.J. The Impact of Environmental Performance on Stock Prices in the Green and Innovative Context. *J. Clean. Prod.* **2021**, *320*, 128868. [CrossRef]
19. Flammer, C. Does Corporate Social Responsibility Lead to Superior Financial Performance? A Regression Discontinuity Approach. *Manag. Sci* **2015**, *61*, 2549–2568. [CrossRef]
20. Lopez, B.; Rangel, C.; Fernández, M. The Impact of Corporate Social Responsibility Strategy on the Management and Governance Axis for Sustainable Growth. *J. Bus. Res.* **2022**, *150*, 690–698. [CrossRef]
21. Li, C.; Wu, M.; Chen, X.; Huang, W. Environmental, Social and Governance Performance, Corporate Transparency, and Credit Rating: Some Evidence from Chinese A-Share Listed Companies. *Pac.-Basin Financ. J.* **2022**, *74*, 101806. [CrossRef]
22. Zhu, B.; Xu, C.; Wang, P.; Zhang, L. How Does Internal Carbon Pricing Affect Corporate Environmental Performance? *J. Bus. Res.* **2022**, *145*, 65–77. [CrossRef]
23. Albuquerque, R.; Koskinen, Y.; Zhang, C. Corporate Social Responsibility and Firm Risk: Theory and Empirical Evidence. *Manag. Sci* **2019**, *65*, 4451–4469. [CrossRef]
24. Brooks, C.; Oikonomou, I. The Effects of Environmental, Social and Governance Disclosures and Performance on Firm Value: A Review of the Literature in Accounting and Finance. *Br. Account. Rev.* **2018**, *50*, 1–15. [CrossRef]
25. Chang, Y.; Du, X.; Zeng, Q. Does Environmental Information Disclosure Mitigate Corporate Risk? Evidence from China. *J. Contemp. Account. Econ.* **2021**, *17*, 100239. [CrossRef]
26. Fan, L.; Yang, K.; Liu, L. New Media Environment, Environmental Information Disclosure and Firm Valuation: Evidence from High-Polluting Enterprises in China. *J. Clean. Prod.* **2020**, *277*, 123253. [CrossRef]
27. He, F.; Qin, S.; Liu, Y.; Wu, J. (George) CSR and Idiosyncratic Risk: Evidence from ESG Information Disclosure. *Financ. Res. Lett.* **2022**, *49*, 102936. [CrossRef]
28. Iatridis, G.E. Environmental Disclosure Quality: Evidence on Environmental Performance, Corporate Governance and Value Relevance. *Emerg. Mark. Rev.* **2013**, *14*, 55–75. [CrossRef]
29. Li, Y.; Gong, M.; Zhang, X.Y.; Koh, L. The Impact of Environmental, Social, and Governance Disclosure on Firm Value: The Role of CEO Power. *Br. Account. Rev.* **2018**, *50*, 60–75. [CrossRef]
30. Liu, C.; Li, Q.; Lin, Y.-E. Corporate Transparency and Firm Value: Does Market Competition Play an External Governance Role? *J. Contemp. Account. Econ.* **2022**, 100334. [CrossRef]
31. Yu, Z.; Jian, J.; He, P. The Study on the Correlation between Environmental Information Disclosure and Economic Performance-With Empirical Data from the Manufacturing Industries at Shanghai Stock Exchange in China. *Energy Procedia* **2011**, *5*, 1218–1224. [CrossRef]
32. da Silva, P.P. Crash Risk and ESG Disclosure. *Borsa Istanb. Rev.* **2022**, *22*, 794–811. [CrossRef]
33. Seth, R.; Mahenthiran, S. Impact of Dividend Payouts and Corporate Social Responsibility on Firm Value—Evidence from India. *J. Bus. Res.* **2022**, *146*, 571–581. [CrossRef]
34. Algarni, M.A.; Ali, M.; Albort-Morant, G.; Leal-Rodríguez, A.L.; Latan, H.; Ali, I.; Ullah, S. Make Green, Live Clean! Linking Adaptive Capability and Environmental Behavior with Financial Performance through Corporate Sustainability Performance. *J. Clean. Prod.* **2022**, *346*, 131156. [CrossRef]

35. Chen, Z.; Xie, G. ESG Disclosure and Financial Performance: Moderating Role of ESG Investors. *Int. Rev. Financ. Anal.* **2022**, *83*, 102291. [CrossRef]
36. Kahloul, I.; Sbai, H.; Grira, J. Does Corporate Social Responsibility Reporting Improve Financial Performance? The Moderating Role of Board Diversity and Gender Composition. *Q. Rev. Econ. Financ.* **2022**, *84*, 305–314. [CrossRef]
37. Wang, S.; Wang, H.; Wang, J.; Yang, F. Does Environmental Information Disclosure Contribute to Improve Firm Financial Performance? An Examination of the Underlying Mechanism. *Sci. Total Environ.* **2020**, *714*, 136855. [CrossRef]
38. Wang, D.; Li, X.; Tian, S.; He, L.; Xu, Y.; Wang, X. Quantifying the Dynamics between Environmental Information Disclosure and Firms' Financial Performance Using Functional Data Analysis. *Sustain. Prod. Consum.* **2021**, *28*, 192–205. [CrossRef]
39. Xu, Q.; Lu, Y.; Lin, H.; Li, B. Does Corporate Environmental Responsibility (CER) Affect Corporate Financial Performance? Evidence from the Global Public Construction Firms. *J. Clean. Prod.* **2021**, *315*, 128131. [CrossRef]
40. Yoo, S.; Managi, S. Disclosure or Action: Evaluating ESG Behavior towards Financial Performance. *Financ. Res. Lett.* **2022**, *44*, 102108. [CrossRef]
41. ben Lahouel, B.; ben Zaied, Y.; Managi, S.; Taleb, L. Re-Thinking about U: The Relevance of Regime-Switching Model in the Relationship between Environmental Corporate Social Responsibility and Financial Performance. *J. Bus. Res.* **2022**, *140*, 498–519. [CrossRef]
42. Ting, P.H. Do Large Firms Just Talk Corporate Social Responsibility?—The Evidence from CSR Report Disclosure. *Financ. Res. Lett.* **2021**, *38*, 101476. [CrossRef]
43. Luo, Y.; Xiong, G.; Mardani, A. Environmental Information Disclosure and Corporate Innovation: The "Inverted U-Shaped" Regulating Effect of Media Attention. *J. Bus Res.* **2022**, *146*, 453–463. [CrossRef]
44. Zhang, H. Mandatory Corporate Social Responsibility Disclosure and Firm Innovation: Evidence from a Quasi-Natural Experiment. *Financ. Res. Lett.* **2022**, *47*, 102819. [CrossRef]
45. Zhang, H.; Xu, T.; Feng, C. Does Public Participation Promote Environmental Efficiency? Evidence from a Quasi-Natural Experiment of Environmental Information Disclosure in China. *Energy Econ.* **2022**, *108*, 105871. [CrossRef]
46. Lin, Y.; Huang, R.; Yao, X. Air Pollution and Environmental Information Disclosure: An Empirical Study Based on Heavy Polluting Industries. *J. Clean. Prod.* **2021**, *278*, 124313. [CrossRef]
47. Lu, J.; Wang, J. Corporate Governance, Law, Culture, Environmental Performance and CSR Disclosure: A Global Perspective. *J. Int. Financ. Mark. Inst. Money* **2021**, *70*, 101264. [CrossRef]
48. Ren, S.; Wei, W.; Sun, H.; Xu, Q.; Hu, Y.; Chen, X. Can Mandatory Environmental Information Disclosure Achieve a Win-Win for a Firm's Environmental and Economic Performance? *J. Clean. Prod.* **2020**, *250*, 119530. [CrossRef]
49. Busch, T.; Lewandowski, S. Corporate Carbon and Financial Performance a Meta-Analysis. *J. Ind. Ecol.* **2018**, *22*, 745–759. [CrossRef]
50. Liu, Y.S.; Zhou, X.; Yang, J.H. Corporate Carbon Emissions and Financial Performance: Does Carbon Disclosure Mediate the Relationship in the UK? *SSRN Electron. J.* **2017**, *3*, 1–35. [CrossRef]
51. Wang, Z. The Study on the Impact of Carbon Emission Reduction on Performance—Based on the Data of the Top 500 Companies. Master's Thesis, Tianjin University, Tianjin, China, 2017.
52. Wang, Y.; Heng, X. Study on the correlation between environmental performance and financial performance of enterprises—Based on data on listed companies in the new energy sector during 2011–2015. *Chin. Agric. Account.* **2017**, *4*, 34–36. [CrossRef]
53. Wu, H.; Liu, Q. Media limelight, environmental performance and financial performance—A Case of listed companies in the chemical industry. *Commer. Account.* **2018**, *7*, 71–74. [CrossRef]
54. Xu, J.; Guan, J.; Lin, Y. Relationship between Corporate Environmental Performance and Corporate Financial Performance: Based on a Meta-Analysis Concerned with Measuring and Situational Factors. *Chin. J. Manag.* **2018**, *15*, 246–254. [CrossRef]
55. Yan, H.; Li, X.; Huang, Y.; Li, Y. The Impact of the Consistency of Carbon Performance and Carbon Information Disclosure on Enterprise Value. *Financ. Res. Lett.* **2020**, *37*, 101680. [CrossRef]
56. Yang, X.; Yuan, Y.; Wang, L. The Relationship Between Environmental Performance and Financial Performance of Agricultural Enterprises: Based on Moderating Effect of Property Nature. *J. Northwest Univ. Philos. Soc. Sci. Ed.* **2017**, *47*, 117–124. [CrossRef]
57. Zhang, Y.; Wang, Y. Research on Dynamic Coordination and Long-term Balanced Development of Listed Companies—Based on Analysis of Environmental Performance and Financial Performance of Steel Industry. *J. Tech. Econ. Manag. Res.* **2018**, *8*, 84–89. [CrossRef]
58. Zhang, T. The Impact of Carbon Emission Constraints to Enterprise Performance Based on Threshold Regression. Master's Thesis, Shandong Normal University, Jinan, China, 2015. [CrossRef]
59. Alam, M.S.; Safiullah, M.; Islam, M.S. Cash-Rich Firms and Carbon Emissions. *Int. Rev. Financ. Anal.* **2022**, *81*, 102106. [CrossRef]
60. Clarkson, P.M.; Li, Y.; Richardson, G.D.; Vasvari, F.P. Does It Really Pay to Be Green? Determinants and Consequences of Proactive Environmental Strategies. *J. Account. Public Policy* **2011**, *30*, 122–144. [CrossRef]
61. Jiang, Y.; Hu, Y.; Asante, D.; Mintah Ampaw, E.; Asante, B. The Effects of Executives' Low-Carbon Cognition on Corporate Low-Carbon Performance: A Study of Managerial Discretion in China. *J. Clean. Prod.* **2022**, *357*, 132015. [CrossRef]
62. Tauringana, V.; Chithambo, L. The Effect of DEFRA Guidance on Greenhouse Gas Disclosure. *Br. Account. Rev.* **2015**, *47*, 425–444. [CrossRef]
63. Córdova Román, C.; Zorio-Grima, A.; Merello, P. Economic Development and CSR Assurance: Important Drivers for Carbon Reporting . . . yet Inefficient Drivers for Carbon Management? *Technol. Forecast. Soc. Change* **2021**, *163*, 120424. [CrossRef]

64. Dhanda, K.K.; Malik, M. Carbon Management Strategy and Carbon Disclosures: An Exploratory Study. *Bus. Soc. Rev.* **2020**, *125*, 225–239. [CrossRef]
65. Karim, A.E.; Albitar, K.; Elmarzouky, M. A Novel Measure of Corporate Carbon Emission Disclosure, the Effect of Capital Expenditures and Corporate Governance. *J. Env. Manag.* **2021**, *290*, 112581. [CrossRef]
66. Linares-Rodríguez, M.C.; Gambetta, N.; García-Benau, M.A. Carbon Management Strategy Effects on the Disclosure and Efficiency of Carbon Emissions: A Study of Colombian Companies' Context and Inherent Characteristics. *J. Clean. Prod.* **2022**, *365*, 132850. [CrossRef]
67. Qian, W.; Hörisch, J.; Schaltegger, S. Environmental Management Accounting and Its Effects on Carbon Management and Disclosure Quality. *J. Clean. Prod.* **2018**, *174*, 1608–1619. [CrossRef]
68. Radu, C.; Caron, M.A.; Arroyo, P. Integration of Carbon and Environmental Strategies within Corporate Disclosures. *J. Clean. Prod.* **2020**, *244*, 118681. [CrossRef]
69. Desai, R. Determinants of Corporate Carbon Disclosure: A Step towards Sustainability Reporting. *Borsa Istanb. Rev.* **2022**, *22*, 886–896. [CrossRef]
70. Gonzalez-Gonzalez, J.M.; Zamora Ramírez, C. Voluntary Carbon Disclosure by Spanish Companies: An Empirical Analysis. *Int. J. Clim. Chang. Strat. Manag.* **2016**, *8*, 57–79. [CrossRef]
71. Liu, C. A Study on the Correlation between Corporate Financial Performance and Carbon Disclosure Level from the Perspective of Synergistic Effect: An Empirical Study Based on the Data of Listed Companies in Henan Province. *Value Eng.* **2017**, *36*, 17–22. [CrossRef]
72. Luo, L.; Lan, Y.C.; Tang, Q. Corporate Incentives to Disclose Carbon Information: Evidence from the CDP Global 500 Report. *J. Int. Financ. Manag. Account.* **2012**, *23*, 93–120. [CrossRef]
73. Wen, S.; Zhou, L. The Influencing Mechanism of Carbon Disclosure on Financial Performance—"Inverted U-shaped" Moderating Role of Media Governance. *Manag. Rev.* **2017**, *29*, 183–195. [CrossRef]
74. Zhang, J.; Ding, R.; Lu, L. The Impact of Carbon Disclosure and Carbon performance on Financial Performance in Energy Industry. *Technol. Dev. Enterp.* **2017**, *36*, 96–97. [CrossRef]
75. Zhao, X.; Yan, G. Business performance and carbon information Disclosure in heavily polluting industries: An empirical study based on CDP China Report from 2008 to 2011. Business performance and carbon information Disclosure in heavily polluting industries: An empirical study based on CDP China Report from 2008 to 2011. *Commun. Financ. Account.* **2014**, *18*, 68–70. [CrossRef]
76. Jiang, Y.; Luo, L.; Xu, J.F.; Shao, X.R. The Value Relevance of Corporate Voluntary Carbon Disclosure: Evidence from the United States and BRIC Countries. *J. Contemp. Account. Econ.* **2021**, *17*, 100279. [CrossRef]
77. Alsaifi, K.; Elnahass, M.; Salama, A. Market Responses to Firms' Voluntary Carbon Disclosure: Empirical Evidence from the United Kingdom. *J. Clean. Prod.* **2020**, *262*, 121377. [CrossRef]
78. Andrew, J.; Cortese, C. Accounting for Climate Change and the Self-Regulation of Carbon Disclosures. *Account. Forum* **2011**, *35*, 130–138. [CrossRef]
79. Fan, H.; Tang, Q.; Pan, L. An International Study of Carbon Information Asymmetry and Independent Carbon Assurance. *Br. Account. Rev.* **2021**, *53*, 100971. [CrossRef]
80. Haslam, C.; Butlin, J.; Andersson, T.; Malamatenios, J.; Lehman, G. Accounting for Carbon and Reframing Disclosure: A Business Model Approach. *Account. Forum* **2014**, *38*, 200–211. [CrossRef]
81. le Ravalec, M.; Rambaud, A.; Blum, V. Taking Climate Change Seriously: Time to Credibly Communicate on Corporate Climate Performance. *Ecol. Econ.* **2022**, *200*, 107542. [CrossRef]
82. Ott, C.; Schiemann, F.; Günther, T. Disentangling the Determinants of the Response and the Publication Decisions: The Case of the Carbon Disclosure Project. *J. Account. Public Policy* **2017**, *36*, 14–33. [CrossRef]
83. CDP. Available online: https://guidance.cdp.net/zh/guidance?cid=18&ctype=theme&idtype=ThemeID&incchild=1&microsite=0&otype=ScoringMethodology&tags=TAG-605%2CTAG-646 (accessed on 10 February 2023).
84. Giannarakis, G.; Konteos, G.; Sariannidis, N.; Chaitidis, G. The Relation between Voluntary Carbon Disclosure and Environmental Performance: The Case of S&P 500. *Int. J. Law Manag.* **2017**, *59*, 784–803. [CrossRef]
85. Jones, C.A.; Levy, D.L. North American Business Strategies Towards Climate Change. *Eur. Manag. J.* **2007**, *25*, 428–440. [CrossRef]
86. Zhang, Q.; Zhang, X. Research on the correlation between environmental regulation, political association and carbon information disclosure. *Commun. Financ. Account.* **2016**, *33*, 43–47. [CrossRef]
87. Guo, T.; Zha, G.; Lee, C.L.; Tang, Q. Does Corporate Green Ranking Reflect Carbon-Mitigation Performance? *J. Clean. Prod.* **2020**, *277*, 123601. [CrossRef]
88. He, Y.; Tang, Q.; Wang, K. Carbon performance and financial performance Account. *Financ. Res. Lett.* **2017**, *2*, 76–82. [CrossRef]
89. Zhang, W.; Lin, W.; Li, Z. How the Growth Rate Influences Low-Carbon Sustainable Production Performance under Different Disposabilities in China's Manufacturing Industries? *J. Clean. Prod.* **2020**, *249*, 119349. [CrossRef]
90. Borissov, K.; Shakhnov, K. Sustainable Growth in a Model with Dual-Rate Discounting. *Econ. Model.* **2011**, *28*, 2071–2074. [CrossRef]
91. Saufi, N.A.A.; Daud, S.; Hassan, H. Green Growth and Corporate Sustainability Performance. *Procedia Econ. Financ.* **2016**, *35*, 374–378. [CrossRef]

92. Surya, A.A.; Rokhim, R. Analysis of the Mitigation Effects of Corporate Social Responsibility on the Negative Impact of High Leverage in ASEAN-5. *Asia Pac. Manag. Rev.* **2021**, *27*, 257–264. [CrossRef]
93. Patel, P.C.; Guedes, M.J.; Soares, N.; da Conceição Gonçalves, V. Strength of the Association between R&D Volatility and Firm Growth: The Roles of Corporate Governance and Tangible Asset Volatility. *J. Bus. Res.* **2018**, *88*, 282–288. [CrossRef]
94. Qiao, S.; Shen, T.; Zhang, R.R.; Chen, H.H. The Impact of Various Factor Market Distortions and Innovation Efficiencies on Profit Sustainable Growth: From the View of China's Renewable Energy Industry. *Energy Strategy Rev.* **2021**, *38*, 100746. [CrossRef]
95. Yu, X.; Dosi, G.; Grazzi, M.; Lei, J. Inside the Virtuous Circle between Productivity, Profitability, Investment and Corporate Growth: An Anatomy of Chinese Industrialization. *Res. Policy* **2017**, *46*, 1020–1038. [CrossRef]
96. Dutta, S.; Nezlobin, A. Information Disclosure, Firm Growth, and the Cost of Capital. *J. Financ. Econ.* **2017**, *123*, 415–431. [CrossRef]
97. Arrigo, E.; di Vaio, A.; Hassan, R.; Palladino, R. Followership Behavior and Corporate Social Responsibility Disclosure: Analysis and Implications for Sustainability Research. *J. Clean. Prod.* **2022**, *360*, 132151. [CrossRef]
98. Nishitani, K.; Unerman, J.; Kokubu, K. Motivations for Voluntary Corporate Adoption of Integrated Reporting: A Novel Context for Comparing Voluntary Disclosure and Legitimacy Theory. *J. Clean. Prod.* **2021**, *322*, 129027. [CrossRef]
99. Meng, J.; Zhang, Z.X. Corporate Environmental Information Disclosure and Investor Response: Evidence from China's Capital Market. *Energy Econ.* **2022**, *108*, 105886. [CrossRef]
100. Zhang, Z.; Su, Z.; Wang, K.; Zhang, Y. Corporate Environmental Information Disclosure and Stock Price Crash Risk: Evidence from Chinese Listed Heavily Polluting Companies. *Energy Econ.* **2022**, *112*, 106116. [CrossRef]
101. Al-Tuwaijri, S.A.; Christensen, T.E.; Hughes, K.E. The Relations among Environmental Disclosure, Environmental Performance, and Economic Performance: A Simultaneous Equations Approach. *Account. Organ. Soc.* **2004**, *29*, 447–471. [CrossRef]
102. Chen, H.; Wang, H.; Chen, Z. Corporate Characteristics and Voluntary Carbon Disclosure: A Perspective of Legitimacy Theory. *Account. Econ. Res.* **2013**, *27*, 30–42. [CrossRef]
103. Kouloukoui, D.; de Marcellis-Warin, N.; Armellini, F.; Warin, T.; Torres, E.A. Factors Influencing the Perception of Exposure to Climate Risks: Evidence from the World's Largest Carbon-Intensive Industries. *J. Clean. Prod.* **2021**, *306*, 127160. [CrossRef]
104. Meng, X.H.; Zeng, S.X.; Shi, J.J.; Qi, G.Y.; Zhang, Z.B. The Relationship between Corporate Environmental Performance and Environmental Disclosure: An Empirical Study in China. *J. Env. Manag.* **2014**, *145*, 357–367. [CrossRef] [PubMed]
105. Bae Choi, B.; Lee, D.; Psaros, J. An Analysis of Australian Company Carbon Emission Disclosures. *Pac. Account. Rev.* **2013**, *25*, 58–79. [CrossRef]
106. Matsumura, E.M.; Prakash, R.; Vera-Muñoz, S.C. Firm-Value Effects of Carbon Emissions and Carbon Disclosures. *Account. Rev.* **2014**, *89*, 695–724. [CrossRef]
107. Qi, X. Study on Influencing Factors of carbon information disclosure of listed companies—Based on panel data analysis of the CDP. *Acad. Bimest.* **2012**, *3*, 49–53. [CrossRef]
108. Gong, N.; Duan, M. The Motivation and Influencing Factors of Corporate Carbon Information Disclosure: An Analysis of the Constituent Enterprises of SSE Social Responsibility Index. *J. Environ. Econ.* **2021**, *6*, 31–52. [CrossRef]
109. Belkhir, L.; Bernard, S.; Abdelgadir, S. Does GRI Reporting Impact Environmental Sustainability? A Cross-Industry Analysis of CO2 Emissions Performance between GRI-Reporting and Non-Reporting Companies. *Manag. Environ. Qual. Int. J.* **2017**, *28*, 138–155. [CrossRef]
110. Siddique, M.A.; Akhtaruzzaman, M.; Rashid, A.; Hammami, H. Carbon Disclosure, Carbon Performance and Financial Performance: International Evidence. *Int. Rev. Financ. Anal.* **2021**, *75*, 101734. [CrossRef]
111. Beijing Municipal Ecology and Environment Bureau. Available online: http://zwfw.sthjj.beijing.gov.cn/crs/ (accessed on 10 February 2023).
112. The People's Government of Henan Province. Corporate Greenhouse Gas Emissions Data System—User's Manual. Available online: https://fgw.henan.gov.cn/filecenter/res_base/rjcms/application/2018/02/28/5a9600c40a24558e6ac5d5cb.pdf (accessed on 10 February 2023).
113. Li, N.; Shi, B.; Kang, R. Information Disclosure, Coal Withdrawal and Carbon Emissions Reductions: A Policy Test Based on China's Environmental Information Disclosure. *Sustainability* **2021**, *13*, 9758. [CrossRef]
114. Tang, Q.; Luo, L. Carbon Management Systems and Carbon Mitigation. *Aust. Account. Rev.* **2014**, *24*, 84–98. [CrossRef]
115. Yu, S.; Hu, X.; Li, L.; Chen, H. Does the Development of Renewable Energy Promote Carbon Reduction? Evidence from Chinese Provinces. *J. Env. Manag.* **2020**, *268*, 110634. [CrossRef]
116. Yunus, S.; Elijido-Ten, E.O.; Abhayawansa, S. Impact of Stakeholder Pressure on the Adoption of Carbon Management Strategies: Evidence from Australia. *Sustain. Account. Manag. Policy J.* **2020**, *11*, 1189–1212. [CrossRef]
117. Zeng, X.; Han, J. Carbon Information Disclosure, Industrial Characteristics and Firm Value: An empirical study based on CDP China Report from 2012 to 2014. *Commun. Financ. Account.* **2016**, *18*, 38–41. [CrossRef]
118. Hrasky, S. Carbon Footprints and Legitimation Strategies: Symbolism or Action? *Account. Audit. Account. J.* **2012**, *25*, 174–198. [CrossRef]
119. Bond, P.; Zeng, Y. Silence Is Safest: Information Disclosure When the Audience's Preferences Are Uncertain. *J. Financ. Econ.* **2022**, *145*, 178–193. [CrossRef]
120. Li, M. Voluntary carbon disclosure and carbon emission performance in the context of economic transformation. *China Bus. Trade* **2017**, *9*, 165–166. [CrossRef]

121. Patel, P.C.; João Guedes, M.; Pagano, M.S.; Olson, G.T. Industry Profitability Matters: The Value of Sustainable Growth Rate and Distance from Bankruptcy as Enablers of Venture Survival. *J. Bus. Res.* **2020**, *114*, 80–92. [CrossRef]
122. Ahsan, T.; Al-GAMRH, B.; Mirza, S.S. Economic Policy Uncertainty and Sustainable Financial Growth: Does Business Strategy Matter? *Financ. Res. Lett.* **2022**, *46*, 102381. [CrossRef]
123. Wen, F.; Li, C.; Sha, H.; Shao, L. How Does Economic Policy Uncertainty Affect Corporate Risk-Taking? Evidence from China. *Financ. Res. Lett.* **2021**, *41*, 101840. [CrossRef]
124. Yu, J.; Shi, X.; Guo, D.; Yang, L. Economic Policy Uncertainty (EPU) and Firm Carbon Emissions: Evidence Using a China Provincial EPU Index. *Energy Econ* **2021**, *94*, 105071. [CrossRef]
125. Wang, A. Connotation and evaluation index system construction of carbon performance. *Financ. Account.* **2014**, *11*, 41–44.
126. Greenhouse Gas Protocol. Available online: https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf (accessed on 10 February 2023).
127. Cong, Y.; Freedman, M. Corporate Governance and Environmental Performance and Disclosures. *Adv. Account.* **2011**, *27*, 223–232. [CrossRef]
128. Elsayih, J.; Tang, Q.; Lan, Y.C. Corporate Governance and Carbon Transparency: Australian Experience. *Account. Res. J.* **2018**, *31*, 405–422. [CrossRef]
129. Yu, E.P.Y.; Luu, B. van International Variations in ESG Disclosure—Do Cross-Listed Companies Care More? *Int. Rev. Financ. Anal.* **2021**, *75*, 101731. [CrossRef]
130. CDP. Available online: https://china.cdp.net/research (accessed on 10 February 2023).
131. Institute of Public & Environmental Affairs. Available online: http://wwwoa.ipe.org.cn//Upload/201712220919570449.pdf (accessed on 10 February 2023).