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Exploring the Triangular Relationship Among Corporate Social Responsibility (CSR), Carbon Emissions, and Corporate Value: An Empirical Investigation

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Abstract

In the context of carbon neutrality, enterprises in the European Union face challenges related to greenhouse gas emissions. With increasing attention on corporate social responsibility and the impact of carbon emission intensity on corporate value, this study selected 50 large EU listed companies as the research subjects and used panel data from 2009 to 2023. A multivariate regression model was employed to empirically test the mediating effect of carbon emission intensity between corporate social responsibility and internal corporate value.The research findings indicate that corporate social responsibility influences internal corporate value, and there indeed exists a mediating effect of carbon emission intensity between corporate social responsibility and internal corporate value, with a mediating effect value of 7.996%..

Keywords : Corporate Social Responsibility; Carbon Emission Intensity; Firm Value; Mediating Effect; Listed Companies

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Introduction

This research investigates the connection among corporate social responsibility (CSR), carbon emissions, and the valuation of businesses. CSR is profoundly complex, intimately linked with every aspect of company operations and the enhancement of corporate value. As societal progress demands higher standards, the public has increasingly higher expectations for the fulfillment of CSR(Yang, 2012). Some scholars argue that CSR significantly influences corporate development and value. This is because the stock prices and market values of publicly listed companies are largely influenced by investors, who consider CSR in their investment decisions. This suggests that CSR subtly but profoundly affects company value. Moreover, (Sitompul et al., 2023) discuss the positive impact of carbon management strategies on corporate financial performance, suggesting that carbon emission data is essential not only for assessing financial risks and opportunities but also plays a significant role in the broader context of corporate governance and sustainability efforts. In light of this, this research aims to clarify the following three core questions:

Does the behavior of fulfilling corporate social responsibility positively affect its company value?

What impact does the behavior of corporate social responsibility have on its carbon emission intensity?

Does carbon emission intensity act as a mediating variable, playing a mediating effect between corporate social responsibility and company value?

As global attention to climate change intensifies, the impact of corporate carbon emission behavior and social responsibility on the capital market is becoming increasingly prominent. Although there's increasing attention, studies exploring the link between social responsibility, carbon emissions, and company worth remain limited. From existing research findings, it is evident that while corporate carbon emissions have attracted attention from both the theoretical and practical fields, research specifically focusing on the relationship between carbon emissions and corporate value remains relatively scarce. Moreover, studies on the impact of carbon emission intensity on corporate value are still in their nascent stages. Moreover, existing investigations into the connection between non-financial data disclosure and business value predominantly concentrate on environmental data sharing and its impact on company worth, paying minimal attention to carbon information. However, whether fulfilling corporate social responsibility can enhance company value has always been a hot topic of interest among scholars. Thus, this study holds significant theoretical and practical implications.

Although the existing literature presents mixed results regarding the impact of CSR on corporate financial performance, recent studies have identified a direct link between robust Environmental, Social, and Governance (ESG) disclosures and improved carbon performance in businesses. For instance, research indicates that corporate ESG disclosures can significantly enhance carbon performance, which may in turn affect corporate value(Yin et al., 2023). These findings suggest that CSR, as a

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component of ESG practices, plays a crucial role in reducing carbon emissions and enhancing corporate value. This study aims to further explore the interplay between CSR, carbon emissions, and corporate value through empirical data, filling the gaps in the existing literature.

To explore the intrinsic connections between corporate social responsibility (CSR), carbon emission intensity, and corporate value, the following three topics need to be discussed: First, examine the relationships between CSR and corporate value, and between CSR and carbon emission intensity, as well as the mediating effect of carbon emission intensity between CSR and corporate value. Second, test the mediating effects while verifying whether there is a U-shaped relationship among the variables. Third, based on the results of the tests in the first two parts, engage in problem discussion and summarization.

Research Foundation and Theoretical Hypotheses

In the European Union, the monitoring and reporting of GHG emissions is governed by comprehensive regulations that ensure data consistency across member states, facilitating the collective assessment of progress towards climate goals (WRI).

Canada's approach includes detailed reporting guidelines that cover a wide array of emissions sources and processes, such as industrial operations and specific GHG sources like flaring and fugitive emissions. This allows for a granular understanding of emissions and aids in policy formation and compliance monitoring(Canada.ca).

The United States has the Greenhouse Gas Reporting Program (GHGRP) managed by the Environmental Protection Agency (EPA), which mandates annual reporting from large emission sources, fuel and industrial gas suppliers, and CO2 injection sites. This program is essential for creating a comprehensive database of emissions that supports policy development and enforcement(US EPA).

Australia's National Greenhouse and Energy Reporting (NGER) system similarly mandates the reporting of GHG emissions, energy production, and consumption data from corporations, providing a crucial foundation for the country's environmental policy and strategy (WRI).

Collectively, these reporting requirements contribute to a better understanding of global GHG emissions and help shape international efforts to address climate change through informed policymaking and effective regulatory frameworks. Such mandatory reporting is critical for tracking progress toward emissions reduction commitments under international agreements like the Paris Agreement (UL Solutions).

In this context, companies are actively taking measures to reduce their carbon emission intensity, transitioning from "high-carbon" operations to "low-carbon" operations. These actions demonstrate an improvement in corporate carbon management capabilities. Carbon management capability is a special ability of companies to coordinate their development with carbon reduction within the context of a green economy. This capability brings new opportunities and resources for corporate development, ultimately impacting corporate performance and company value.

Correlation Between Corporate Social Responsibility and Corporate Market Value

CSR as a distinctive resource of companies, can substantially influence a company's performance to a certain extent. Companies, throughout their different stages of development, have varying demands for resources but consistently strive to utilize these resources efficiently to foster development and enhance corporate value(Barnea and Rubin, 2010). However, due to potential discrepancies in information transmission, there's a likelihood that management might pursue personal gains in the guise of executing CSR, possibly leading to an excessive waste of corporate resources(Brammer and Millington, 2008, Williamson, 1963). This implies that the execution of CSR could either elevate or diminish corporate value. According to stakeholder theory, the pursuit of corporate development aims to benefit all stakeholders collectively. From a cost control perspective, engaging in CSR activities entails the consumption of human and material resources, potentially reducing corporate value(Dunfee, 2006). Conversely, from the perspective of building a corporate image, the dissemination of positive news regarding a company's CSR initiatives to the public and other stakeholders can result in an influx of economic benefits, favorably impacting corporate value(Huang and Yao, 2016).

Research on the relationship between corporate social responsibility (CSR) and corporate value primarily yields three perspectives.

The first viewpoint posits a positive correlation between CSR and corporate value. (Johnson, 2003) suggest that, to some extent, corporate engagement in social responsibility can generate wealth for the business. (Mackey et al., 2007) argue that CSR practices in publicly listed companies can maximize market value. (Chen et al., 2020), using data from Shanghai and Shenzhen stock markets, found that CSR significantly enhances corporate value. This conclusion was also confirmed by (He et al., 2020).

The second viewpoint suggests a negative correlation between CSR and corporate value. (Yang and Yang, 2016) believe that CSR implementation inevitably increases operational costs, ultimately impacting financial performance and corporate value. (Tu and Zheng, 2018) found that while CSR might decrease a company's value in the short term, it tends to increase it in the long run.

The third viewpoint argues that there is no linear relationship between CSR and corporate value. (Shan et al., 2019) observed an inverted U-shaped relationship between CSR and financial performance. Meanwhile, (Dou, 2015) notes that the impact of CSR on financial performance is minimal and that its influence on corporate value is a lengthy process. In the short term, CSR implementation requires significant resources, which can adversely affect the business; however, in the long term, the effects might be positive.

Based on the analysis above, the following hypotheses are proposed:

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H1: Corporate social responsibility has a negative impact on internal company value.

H2: There is an inverted U-shaped relationship between corporate social responsibility and internal company value.

The Correlation Between Corporate Social Responsibility and Carbon Emission Intensity

Research on the relationship between CSR and carbon emission intensity is scarce. However, there is a considerable amount of research on the relationship between CSR and environmental sustainability. (Doran and Ryan, 2012) analyzed data from 2,000 Irish companies and found that increased public awareness of environmental protection and consumers' progressive perceptions of products could influence corporate green innovation. (Bitat, 2018) discovered that environmental policies could encourage companies in Germany with high environmental CSR to intensify their green innovation activities. (Hu and Zhang, 2020) focused on listed companies in China and found a reverse pushing effect between corporate environmental responsibility and green innovation. Moreover, it was observed that political-corporate connections have a negative regulatory effect on the positive correlation between corporate environmental social responsibility and green innovation. This implies that an improvement in corporate environmental social responsibility can enhance green innovation. To some extent, green innovation can reduce energy consumption and use, thereby achieving the effect of corporate carbon emission reduction. This also reflects the intensity of corporate carbon emissions.

Enterprises conscious of their social responsibility employ a variety of methods to reduce carbon dioxide emissions. On one hand, carbon emissions from corporate production can be reduced through innovative production technologies (Diamond, 2009); as the development index of capital markets increases, companies are inclined to implement carbon reduction strategies to establish a positive image, thereby diversifying risks and reducing financing costs (Shahbaz et al., 2013). Producing low-carbon green products and participating in carbon reduction projects provide companies with additional tax reliefs while alleviating external environmental policy pressures and public demands (Sprinkle and Maines, 2010).

On the other hand, the indirect carbon reduction by corporations deserves attention, namely, the corporate social responsibility actions that can inspire positive and cognitive feedback from consumers (Sen and Bhattacharya, 2001). The production of low-carbon products by companies can promote changes in the consumption patterns and lifestyles of the regional population, reflecting a high potential for emission reductions within the region. (Druckman and Jackson, 2009) also pointed out that compared to annual industrial carbon reduction targets, carbon emissions from residential activities are still growing at a rate exceeding 3% per year, and the potential for carbon reduction from changes in regional lifestyles and consumer behaviors is comparable to direct corporate reductions.

Based on the analysis above, the following hypotheses are proposed:

Ha: Corporate social responsibility has a negative impact on carbon emission intensity.

Hb: There is a U-shaped relationship between corporate social responsibility and carbon emission intensity.

The Correlation Between Corporate Social Responsibility, Carbon Emission Intensity, and Company Value

(Hu and Zhang, 2020) have indicated that CSR can have a positive impact on environmental performance and green innovation, while the emergence of green inventions can also reduce greenhouse gas emissions. This suggests that the enhancement of CSR can, to some extent, lead to a reduction in carbon emissions. Therefore, under constant conditions, the intensity of carbon emissions would also decrease. Concurrently, there is literature support for a relationship between company value and carbon emissions. (Bai and Zhang, 2019) discovered that for companies with low carbon emissions, there exists a positive link between carbon emissions and the value of a company; yet, for firms with substantial carbon emissions, a notable negative relationship is observed between their total carbon emissions and their market value. In essence, it's feasible to devise a research framework encapsulating "Corporate Social Responsibility - Carbon Emission Intensity - Company Value".

Research by (Matsumura et al., 2014) demonstrates that carbon emissions are negatively correlated with a company's market value and negatively correlated with the cost of equity capital, while positively correlated with the cost of debt capital. (Chapple et al., 2011) indicates that, compared to low-carbon emitting firms, high-carbon emitters are subjected to more severe market penalties, anticipated to affect up to 6.57% of a company's total market value. (Johnston et al., 2008) have studied capital market pricing of sulfur dioxide emission allowances held by U.S. power companies, using these allowances as a proxy. Their findings suggest that emission allowances possess asset value and real options value, but the capital market places greater emphasis on the asset value of the emission allowances.

Based on the analysis above, which suggests that carbon emission intensity has a certain impact between corporate social responsibility and company value, the following hypotheses are proposed:

H5: Carbon emission intensity mediates the relationship between corporate social responsibility and internal company value.

H6: Carbon emission intensity mediates the inverted U-shaped relationship between corporate social responsibility and internal company value.

Empirical Design

Sample Selection and Data Sources

This paper focuses on EU-listed companies. Since the CDP began distributing questionnaires to S&P 500 companies in 2007, the response rate has increased annually. Additionally, the EPA's "Greenhouse Gas Mandatory Reporting Rule" mandates that, starting January 1, 2010, suppliers of fossil fuels and industrial gases, along with vehicle and engine manufacturers, must

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submit annual GHG emissions reports to the EPA. The research samples are categorized based on carbon emission intensity. Consequently, this paper utilizes data from EU-listed companies for the years 2009—2023.

Given the challenges in acquiring carbon emission data, its accuracy, and comparability, the study sample excluded companies with sparse disclosure of carbon emission data, ultimately refining and selecting 50 companies. The data for this paper primarily comes from the Eikon database, and empirical analysis is conducted using Stata.

Two main considerations were taken into account when selecting the data: first, as prominent large enterprises, if EU-listed companies cannot set an example, it is less likely to prompt action from other businesses; second, the availability of data, as the disclosure of carbon emission data is entirely at the discretion of the companies. While many are cooperative in publishing information on climate change, such as carbon emissions and reduction data, many have not responded. Therefore, companies that do not disclose carbon emission data in their social responsibility reports are not included in the scope of this study.

Variable Definitions

1) Explanatory variables. The internal value of a company (Tobin Q). There are many ways to measure a company's value. Some scholars, both domestic and international, use market capitalization (Market) and Tobin's Q as proxies. Following the majority of the literature, this study adopts Tobin's Q to represent the internal value of the company.
2) Dependent variable. Corporate Social Responsibility (CSR). Considering the accuracy and objectivity of the data, the ESG Score from Eikon is chosen.
3) Mediating variable. Carbon Emission Intensity (Carbon) is regarded in most social responsibility reports as the amount of carbon emissions per unit of revenue. To standardize, the data is logarithmically transformed.
4) Control variables. Given the numerous factors that can affect company value, the most representative indicators of a company's overall situation are selected as control variables. Specific variable selections, definitions, coding, and symbols are shown in Table 1.

Table 1 Variable Definitions

	Variable Name	Variable Symbol	Variable Definition
Explained Variables	Internal Company Value	Tobin Q	(Market value of equity + book value of total liabilities) / Book value of total assets
Explanatory Variables	Corporate Social Responsibility	Csr	ESG score
Mediating Variables	Carbon Emission Intensity	Carbon	Carbon emissions / Operating revenue ratio
Control Variables	Company Size	Size	Logarithm of total assets
	Profitability	Roe	Net profit / Average shareholder equity
	Operating Capability	Oc	Operating revenue / Total assets
	Solvency	Dpa	Operating cash flow / Total liabilities
	Development Capability	Growth	(Current period operating revenue - Previous period operating revenue) / Previous period operating revenue
	Capital Density	Cd	Operating revenue / Shareholders' equity

Model Design

To analyze the relationships among corporate social responsibility, carbon emission intensity, and company value, this paper will test the hypotheses H1, H2, Ha, Hb, H5, and H6 related to internal company value. The regression models constructed in this paper incorporate the mediating effect model method proposed by (Wen et al., 2004). The model construction for both internal and external company value is described below.

Model 1 is constructed to explore the relationship between CSR and Internal Company Value (TobinQ). Hypothesis H1 is confirmed if the coefficient a_1 of CSR is less than 0 and significant.

$$Tobin\,Q = c_1 + a_1 Csr + b_1 Controls + \varepsilon$$

To further test the inverted U-shaped relationship between CSR and Internal Company Value (TobinQ), Model 2 is constructed.

$$Tobin\,Q = c_2 + d_1 Csr + e_1 Csr * Csr + b_2 Controls + \varepsilon$$

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Model a is designed to explore the relationship between CSR and Carbon Emission Intensity (Carbon). Hypothesis Ha is confirmed if the coefficient a_2 of CSR is less than 0 and significant.

$$Carbon = c_3 + a_2 Csr + b_3 Controls + \varepsilon$$

To further test the U-shaped relationship between CSR and Carbon Emission Intensity (Carbon), Model b is constructed.

$$Carbon = c_4 + d_2 Csr + e_2 Csr * Csr + b_4 Controls + \varepsilon$$

Model 5 is constructed to explore the effects of CSR and Carbon Emission Intensity (Carbon) on Internal Company Value (Tobin Q).

$$Tobin\ Q = c_5 + a_3 Csr + f_1 Carbon + b_5 Controls + \varepsilon$$

To further examine the mediating role of Carbon Emission Intensity (Carbon) in the inverted U-shaped relationship between CSR and Internal Company Value (Tobin Q), Model 6 is constructed.

$$Tobin\ Q = c_6 + d_3 Csr + e_3 Csr * Csr + f_2 Carbon + b_6 Controls + \varepsilon$$

In the models, the dependent variable Tobin Q represents the internal company value; the mediating variable Carbon is the logarithm of carbon emissions per unit of revenue, representing carbon emission intensity; the explanatory variable CSR is the total score of each company in corporate social responsibility from Eikon; the control variables, Controls, include six variables encompassing company size, capital intensity, and four capabilities. Additionally, c1, c2, c3, c4, c5, c6 are constants; a1, a2, a3, d1, d2, d3, b1, b2, b3, b4, b5, b6, e1, e2, e3, f1, f2 are coefficients, and ε represents the error term.

Empirical Results and Analysis

Descriptive Statistics of Variables

From the descriptive statistics in Table 2, it can be observed that there is a significant difference between the maximum and minimum values of internal company value, at 43.63418 and 0.6212773, respectively. Corporate social responsibility scores, on a full scale of 100, range from a low of 21 to a high of 88, showing that while some companies excel in social responsibility, others need to improve their performance. Carbon intensity has a minimum value of -5.750335 and a maximum of only -0.3445928.

Table 2 Descriptive Statistics

Variable Name	Symbol	Mean	Median	Maximum	Minimum	Standard Deviation
Internal Company Value	Tobin Q	2.5052	1.4948	43.6341	0.6212	3.7148
Corporate Social Responsibility	Csr	57.1465	57.2276	88.0000	21.0000	11.8517
Carbon Emission Intensity	Carbon	-4.0975	-4.3482	-0.3445	-5.7503	0.9546
Company Size	Size	4.4586	4.4736	5.6165	2.0660	0.5468
Profitability	Roe	0.1350	0.1295	2.0625	-1.5186	0.1572
Operating Capability	Oc	0.8055	0.720	2.9494	0.0117	0.4132
Solvency	Dpa	0.2039	0.1521	2.3764	0.0006	0.2280
Development Capability	Growth	0.0394	0.0390	2.4740	-0.6701	0.2093
Capital Density	Cd	2.3601	1.8230	35.4107	0.0517	2.3165

Stationarity Test

To avoid the occurrence of spurious regression or false regression phenomena, stationarity tests were conducted on each time series in the regression analysis. Therefore, before constructing the regression model, it is necessary to test the stationarity of each variable in the model. This paper uses the Hadri test in Stata to test each variable, and the results are shown in Table 3. Each variable passed the stationarity test, indicating that the regression model can be established.

Table 3 Hadri Lagrange multiplier stationarity test

Variable Name	Symbol	z	p	Stationarity Status
Internal Company Value	Tobin Q	21.5685	0.0000	Stationary

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Corporate Social Responsibility	Csr	22.7994	0.0000	Stationary
Carbon Emission Intensity	Carbon	24.5335	0.0000	Stationary
Company Size	Size	27.6327	0.0000	Stationary
Profitability	Roe	4.6426	0.0000	Stationary
Operating Capability	Oc	13.6532	0.0000	Stationary
Solvency	Dpa	12.5912	0.0000	Stationary
Development Capability	Growth	2.4861	0.0065	Stationary
Capital Density	Cd	5.7217	0.0000	Stationary

Regression Analysis

Using Stata, regression analyses were conducted on data from 2009 to 2023 to determine the impact of corporate social responsibility (CSR) on company value, the impact of CSR on carbon emission intensity, and the combined effect of CSR and carbon emission intensity on company value. Since the study uses panel data, a fixed effects model was chosen as more suitable for testing. To address the issue of panel heteroscedasticity, a weighted multiple regression model was used for empirical testing.

Internal Company Value Model Analysis

This section uses CSR as the independent variable and internal company value (Tobin Q) as the dependent variable, along with control variables, for empirical research. The empirical results are shown in Table 4.

Table 4 Tobin Q

Variables	Model 1	Model 2	Model a	Model b	Model 5	Model 6
C	-0.0156807***	-0.0096549**	-0.0287102 ***	-0.0277968 ***	-0.0141359***	-0.0078902
Csr	-0.0882096***	-0.1087285***	0.002647*	-0.0004635	-0.084147***	-0.1053705***
Csr * Csr		-0.0189482***		-0.0021389**		-0.0196167***
Carbon					0.4099725***	-0.1300943
Size	-1.495653***	-1.514034***	-0.2354363***	-0.2373162***	-1.420335***	0.4119197***
Roe	0.017682***	0.0176685***	0.007064***	0.0069497***	0.0142226 ***	-1.439007***
Oc	0.5174813***	0.5069852***	-0.1577015***	-0.1584492 ***	0.5701675***	0.0141921***
Dpa	0.0085815**	0.0072957	0.0050919 ***	0.0051726 ***	0.003902	0.5595513***
Growth	0.0136802***	0.0147142***	-0.01821 ***	-0.0181635***	0.0230512 ***	0.0241662***
Cd	0.1124401***	0.1123891***	0.0084516	0.0083952***	0.1097712 ***	0.1097057***
R2	0.4968	0.4975	0.2609	0.2611	0.5022	0.503
Adj. R2	0.4951	0.4958	0.2585	0.2588	0.5005	0.5012
F-statistic	4.533	4.31	16.071	16.17	4.444	4.229
Wooldridge Test	0.2437	0.2471	0.6013	0.6102	0.2549	0.2582

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Model 1 tests the impact of Corporate Social Responsibility (CSR) on corporate internal value. The empirical results show a significant relationship in Model 1, with a CSR coefficient of -0.0882096, indicating a negative correlation between CSR and corporate internal value. Hence, Hypothesis 1 (H1) is supported. Model 2 incorporates the variable CSR*CSR and displays significant results. However, this model does not support Hypothesis 2 (H2), indicating that there is no inverted U-shaped relationship between CSR and internal company value. Instead, as CSR activities increase further, their negative impact on company value intensifies. This could be due to lukewarm or negative reactions from the market and consumers towards the company's CSR initiatives, or a perception that these activities are insufficient to offset other negative business practices. Therefore, even with increased CSR efforts, company value may decline.

Model a examines the impact of CSR on carbon emissions intensity. The significant results indicate that CSR positively correlates with carbon emissions intensity, with a CSR coefficient of 0.002647. The increase in CSR activities significantly impacts carbon emission intensity. The significant positive coefficient indicates that as CSR activities increase, carbon emission intensity slightly rises. This may reflect that initial CSR activities lead to increased carbon emissions due to the use of additional resources, such as the implementation of new environmental equipment or technologies. Model b, compared to Model a, incorporates the variable CSR*CSR. The empirical results show that the relationship is not statistically significant, and thus Hypothesis Hb does not hold, indicating that there is no U-shaped relationship between corporate social responsibility (CSR) and carbon emission intensity.

Model 5 tests the effects of Corporate Social Responsibility (CSR) and carbon emission intensity on the internal value of the company. Empirical results indicate that CSR has a significant negative correlation with internal corporate value, with a coefficient of -0.084147, $p<0.05$. Simultaneously, the coefficient for carbon emission intensity (Carbon) is 0.4099725, significantly positive, possibly reflecting that higher carbon emissions are associated with higher levels of industrial activity and economic benefits. Additionally, the adjusted R-squared for Model 5 is 0.5005, an improvement from Model 1's 0.4951, indicating a good fit of the data. Model 6 introduces the CSR * CSR interaction term and finds that the empirical results are not significant, thus Hypothesis 6 (H6) does not hold.

Following the mediation effect testing method of (Wen et al., 2004), the comparison is as follows:

Step one: The coefficient a1 in Model 1 is significant

Step two: The coefficient a2 in Model a is also significant

Step three: The coefficient a3 in Model 5 is significant.

Therefore, the mediation effect of carbon emission intensity is classified as a “partial mediation effect”, thus Hypothesis 5 (H5) holds. The proportion of the mediation effect of carbon emission intensity in the total effect is shown in Table 5.

Table 5 Testing the mediating effect of carbon emission intensity

Model	Standardized Regression Equation	Regression Coefficient Test
Model 1	y = -0.0882096 x	SE=0.0078316 ; t=-11.26 ***
Model 5	m = -0.2052x	SE=0.0077956 ; t=-10.79***
Model 7	y = -0.0319659x - 0.0343736m	SE=0.0045156 ; t=-7.08*** SE=0.0213124 ; t=-1.61

The proportion of the mediation effect in the total effect is calculated as = 0.2052 × 0.0343736 / 0.0882096 = 7.996%, meaning the mediation effect accounts for 7.996%. This research on the impact on corporate internal value introduces an additional pathway beyond the "Corporate Social Responsibility—Corporate Internal Value" relationship, namely "Corporate Social Responsibility—Carbon Emission Intensity—Corporate Internal Value". On one hand, corporate social responsibility has a direct negative effect on corporate internal value; companies with greater CSR engagement tend to see a reduction in their value to some extent. On the other hand, corporate social responsibility indirectly negatively affects company value through corporate carbon intensity. This implies that companies that engage more in corporate social responsibility activities tend to increase their carbon emission intensity, which in turn leads to an increase in company value.

The scenario where CSR activities lead to an increase in carbon emissions may reflect the complexity and diversity inherent in executing corporate social responsibility strategies. Although CSR is generally intended to enhance a company's social and environmental impact, if these measures are primarily focused on non-environmental areas, such as community development or improving employee welfare, without adequately considering their environmental costs, it can result in increased energy usage and higher carbon emissions. This phenomenon highlights the need for companies to comprehensively consider both the direct and indirect environmental impacts when formulating and implementing CSR activities, to ensure that these measures not only meet social responsibility goals but also sustain environmental viability.

Conclusions and Policy Recommendations

Conclusions

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This paper investigates the relationship between corporate social responsibility, carbon emission intensity, and company value using data from 50 EU-listed companies spanning from 2009 to 2023. The study concludes by drawing insights from the findings.

The analysis of internal company value yielded the following results: First, there is a significant mediating effect of carbon emission intensity between corporate social responsibility (CSR) and internal company value. This suggests that CSR can substantially influence internal company value through the intensity of carbon emissions. Second, there is a significant negative correlation between CSR and internal company value. Third, there is a positive correlation between CSR and carbon emission intensity in large enterprises.

In exploring the relationship between corporate social responsibility (CSR) and company value, this study has yielded results that differ from those of some scholars. A possible reason for this discrepancy is that while the fulfillment of environmental CSR can enhance green innovation and reduce environmental damage, it also increases corporate costs. Particularly when using Tobin's Q as an indicator of internal company value, an increase in costs may not immediately lead to an increase in returns, thus affecting the actual output efficiency of assets, i.e., the ratio of market value to asset cost, resulting in a decrease in Tobin's Q value, which reflects a decrease in internal company value. In addition, this research examines the interrelationships among corporate social responsibility, carbon emission intensity, and company value together, finding that carbon emission intensity mediates the relationship between CSR and company value. Integrating related theories, the relationship "CSR—carbon emission intensity—company value" can be easily explained.

The quality of a company's development cannot be assessed in isolation. Compared to financial performance, one cannot deny the importance of environmental awareness in carbon management, nor can one ignore the economic benefits brought by high carbon-emitting companies, which simultaneously pose risks to our environment. For long-term effective development of both the economy and the ecology, companies should actively fulfill their CSR obligations. Only by not sacrificing the environment for economic growth can we achieve global sustainable development.

Policy Recommendations

As times progress, the public has set higher expectations for companies to fulfill their corporate social responsibilities (CSR). It is a trend for companies to undertake CSR, but overdoing it can inevitably lead to a decrease in company value. There is still much debate about the impact of carbon reduction on company value, and the disclosures and effects of many companies' carbon reduction have not been adequately verified. Therefore, the management of carbon emissions should not be limited only to the reduction of carbon emissions; more emphasis should be placed on reducing carbon emission intensity.

Countries need to unite and collaborate, sharing the responsibility and mission of carbon reduction. Companies should fulfill their social responsibilities appropriately, intensify efforts towards low-carbon emission reduction, and ultimately achieve sustainable development.

Further Recommendations

Measuring a company's CSR encompasses many aspects, such as social responsibility involving employee welfare and working environment. This part may weaken the mediating effect of carbon emission intensity. Future research could break down CSR into multiple components for separate investigation.

This study chose Tobin's q as the internal value measurement indicator because internal financial data are generally more accessible, especially for listed companies. These data are highly consistent and standardized, which facilitates time-series analysis and horizontal comparisons. Subsequent research could focus on external values, which typically include market share, brand value, customer satisfaction, etc. These indicators can comprehensively reflect a company's market position and brand influence from multiple perspectives—a comprehensiveness that internal financial indicators fail to provide, especially in assessing the social and environmental effects of CSR activities. For convenience in future research, this paper also provides data on external values for further study.

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