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The Controversial Link between CSR and Financial Performance: The Mediating Role of Green Innovation

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Abstract: The contentious relationship between corporate social responsibility (CSR) and corporate financial performance (CFP) has been extensively and yet inconclusively debated in the sustainability literature. We further investigate the link between CSR and CFP by examining the mediating role of green innovation performance (GIP). We perform pooled ordinary least squares (OLS) analysis on a panel data of UK firms from 2006 to 2017 provided by the ASSET4 database. We find that CSR is positively and significantly associated with CFP and that GIP plays a significant and positive mediating role in this relationship. Our findings contribute to the extant sustainability literature by using a comprehensive measure of CFP and addressing the mediating effects of GIP on the link between CSR and CFP. The results provide policy, practice, and research implications as investors demand more robust CSR information, regulators establish environmental and climate change rules, and companies focus on the efficiency and effectiveness of their green innovation practices and performance.

Keywords: CSR; ESG; green innovation; corporate financial performance (CFP)

Citation: Homayoun, S.; Mashayekhi, B.; Jahangard, A.; Samavat, M.; Rezaee, Z. The Controversial Link between CSR and Financial Performance: The Mediating Role of Green Innovation. *Sustainability* **2023**, *15*, 10650. https://doi.org/10.3390/su151310650

Academic Editors: Wen-Hsien Tsai and Donato Morea

Received: 17 April 2023
Revised: 23 June 2023
Accepted: 3 July 2023
Published: 6 July 2023

1. Introduction

Globalization has caused the context of firms' operations and related disclosures to change at a rapid pace in the past several decades. Stakeholders including shareholders and regulators demand more economic financial information and non-financial social and environmental information in their decision-making processes [1]. Thus, corporations consider corporate social responsibility (CSR) an important management tool to develop and achieve their financial and non-financial goals [2–4]. CSR is considered a requirement for organizations that must be implemented to ensure that public expectations are met in an economic system [5]. The term CSR refers to all of a company's obligations to its internal and external stakeholders, including shareholders, employees, customers, suppliers, the environment, and society [6].

Academics have been paying attention to CSR for decades [7–10] in addressing the potential link between financial performance and CSR performance, which is important to investors [11,12]. The issue of whether investing in CSR leads to companies' competitive advantage and improved financial performance is increasingly a concern for academics and practitioners [9,13]. Despite the substantial number of studies that have examined this link [14], prior research shows mixed results [15,16]. While some research documents a positive relationship between CSR and corporate financial performance (CFP) [17,18], others report a negative relationship between the two variables [19,20]. Ref. [21] performed a synthesis of CSR studies and suggested that more research on the controversial link between CSR and CFP is needed. Motivated by anecdotal evidence suggesting the ever-increasing importance of CSR for investment decision making and the literature indicating

the need for more research on CSR [22], this study examines the mediating role of green innovation performance (GIP) in the relationship between CSR and CFP.

One of the concepts that can be used as a mediator and mechanism to explain the relationship between CSR and CFP is green innovation. Innovation is an important factor for firms' success in the long term [23] and can lead to better financial performance [24]. Green innovation is an advanced version of innovation, that includes technological expansions that preserve energy, prevent pollution, recycle garbage, and design green products [25]. Green innovation is an important proactive way of contributing to environmental development, and green innovative companies are gradually leading changes in the market [26]. Therefore, attention on green innovation is vital. Previous research implies that CSR activities can help companies improve efficiency and effectiveness and enhance innovation [27]. Therefore, it is likely that CSR improves innovation, which, in turn, bolsters a company's financial performance. Prior research suggests that innovation is related to improved CFP; however, there is little understanding regarding how CSR enhances CFP through innovation [28,29]. Herein, we analyze the "black box" of the link between CSR and CFP by scrutinizing the mediating role of firms' green innovation performance (GIP). Specifically, our study addresses the following research questions:

1. How does a company's social responsibility performance affect its financial performance?
2. How does a company's social responsibility performance affect green innovation?
3. Is there a role for green innovation in the relationship between a company's social responsibility and financial performance?

We address the mentioned research questions by using the panel data provided by the ASSET4 database, which covers a sample of 251 UK companies from 2006 to 2017. We find that CSR is positively and significantly associated with CFP and GIP plays a positive and significant mediating role in this relationship.

This study contributes to the existing literature in some significant ways, both in theory and practice. First, it extends our understanding of the relationship between CSR and CFP by introducing green innovation as a new mechanism. Previous research has examined the mediating role of variables such as intellectual capital, reputation, and customer satisfaction in the CSR–CFP link. However, this study adds to the literature by highlighting green innovation as an additional pathway through which CSR can influence CFP. This contribution expands the theoretical understanding of how CSR initiatives, specifically through green innovation, can impact financial performance. Second, this study addresses the issue of measurement error in assessing CFP within the CSR–CFP link. While prior literature recognizes errors in measuring CSR, the measurement of CFP has been relatively overlooked. Most studies traditionally rely on financial indicators such as return on assets (ROA), return on equity (ROE), and Tobin's Q as proxies for CFP. However, these measures may not comprehensively capture all financial aspects impacted by CSR activities, including factors such as customer loyalty. Consequently, the lack of comprehensive measurement of CFP has contributed to mixed results in the CSR–CFP relationship. To overcome these limitations, this study proposes the use of comprehensive indicators offered by commercial databases, specifically the economic pillar of the ASSET4 database, to measure CFP. By employing these comprehensive indicators, which consider a broader range of financial performance aspects, this study aims to mitigate the confusion surrounding the CSR–CFP relationship and provide a more holistic understanding of its dynamics. Third, this study offers practical implications for organizations aiming to enhance their CSR initiatives and improve financial performance. By recognizing the role of green innovation as a mechanism linking CSR to CFP, companies can prioritize sustainable practices that go beyond traditional financial indicators. The use of comprehensive indicators such as those provided by the ASSET4 database allows organizations to measure and evaluate the impact of their CSR efforts on various financial aspects, including customer loyalty, providing a more accurate assessment of their financial performance. Finally, this study presents policy implications by underscoring initiatives undertaken by regulators worldwide to address environmental and climate change issues.

The remainder of this essay is structured as follows. The literature is reviewed and hypotheses are developed in Section 2. The approach and sample are discussed in Section 3. Section 5 concludes this paper after Section 4 presents the key findings.

2. Literature Review and Hypothesis Development

2.1. Corporate Social Responsibility and Corporate Financial Performance

In clarifying the connection between CFP and CSR performance and its importance in business value creation, Ref. [30] offered a number of CSR theories, including stakeholder, shareholder, signaling, legitimacy, institutional, and stewardship theories. Collectively, these theories contend that businesses that put equal emphasis on CFP and CSR are more sustainable and are able to bolster their earnings [31]. However, the link between CFP and CSR is complex, and finding a single theory that explains this link is challenging. Thus, management should focus on achieving both financial CFP and non-financial CSR performance in generating shared value for all stakeholders. In general, the literature seems to corroborate the existence of a positive link between CSR and CFP [32]. This aligns with the principles of instrumental stakeholder theory [33,34] and the resource-based view [35], which both posit a positive correlation between corporate social performance (CSP) and CFP. By analyzing 34 research papers, Ref. [36] also noted that 68 percent of studies report a positive relationship between CSR and CFP. They only found a negative or insignificant association between these two variables in 32 percent of the studies they examined. According to shareholder theory, which views CSR as a costly activity that generates no additional value [37], there exists a negative association between CSR and CFP. Several studies conducted using different samples of data have come to the conclusion that CSR has a positive relationship with CFP. For instance, Ref. [38] examined corporations operating in the UK and discovered that there is an increase in market value for enterprises with a higher level of social disclosure. In another study, Ref. [39] found a positive correlation between the two using a sample of US firms. Using a sample of Taiwanese businesses, [40,41] demonstrated a positive relationship between CSR and CFP. According to [42], there is a favorable connection between CSR and CFP for Indian enterprises across all CSR-related activities. For the other parts of the world, Ref. [27] discovered that CSR significantly affected the return on assets (ROA) of Chinese mineral companies from 2010 to 2013, and Ref. [43] provided evidence that there are significant performance enhancements due to CSR practices for African companies.

The environmental aspect of CSR can also bolster CFP because environmental responsibility can cut costs for the firm, e.g., by recycling waste and reducing energy and water consumption [44]. Ref. [45] observed that CSR activities promote companies' image and reputation and increase their value at national and international levels. CSR fosters a long-lasting relationship between society and businesses, and customers favor the goods produced by socially conscious businesses [46].

In addition to considering the results of previous research, we use lenses of relevant and CSR sustainability theories in order to arrive at more sound hypotheses. The resource-based view is a theoretical lens that explicates how businesses may use CSR initiatives to gain a competitive edge and promote sustainable development [16]. Ref. [47] found the resource-based view to be a valuable framework for studying the outcomes of CSR activities. Ref. [48] also defined CSR practices as resources that provide internal and external advantages. Similarly, according to [49], the ideal way to define a firm is as a combination of "difficult to imitate" resources and capabilities. These resources and capabilities are unique to the firm, and instead of focusing on the competitive market, firms should concentrate on exploring these resources.

Another theoretical framework close to the resource-based view of the firm is the natural-resource-based view introduced by [35]. This view extends the resource-based view of the firm by taking into account sustainable development, product stewardship, and pollution reduction as ways to gain a competitive edge. Utilizing this theory, Ref. [16] argued that CSR practices are innate capabilities that firms can capitalize on to obtain

a competitive advantage. Additionally, Ref. [50] classified stakeholder theory into three approaches: descriptive, normative, and instrumental approaches. The instrumental approach underscores the role trust and cooperation play in generating organizational wealth and competitive advantage. Hence, we contend that CSR is positively associated with CFP. Accordingly, we state the following hypothesis in addressing our first research question:

Hypothesis 1. *Corporate social responsibility (CSR) performance is positively associated with corporate financial performance (CFP).*

2.2. Corporate Social Responsibility and Green Innovation Performance

Existing research indicates that innovation plays a critical role in the long-term success of companies in a competitive environment [51]. Companies that embrace innovative initiatives are better equipped to respond swiftly to current environmental challenges [52]. According to the resource-based view, innovation represents an intangible capability that can yield competitive advantages and enhance CFP [24]. In recent years, the concept of green innovation has garnered increasing attention. It represents a more advanced form of innovation, encompassing both virtual and physical innovations in software or hardware. Green innovation involves upgrading processes and products through the utilization of technologies that conserve energy, prevent pollution, recycle waste, support the of design eco-friendly products, employ environmentally friendly packaging, and adopt sustainable management practices [53]. Green innovation differs from traditional innovation by specifically addressing environmental regulations and the ecological concerns of the market [51].

Prior studies suggest that CSR has a direct positive influence on innovation [54,55]. Furthermore, environmentally conscious businesses are more likely to implement technological innovation [56]. Although environmental responsibility comes with higher operating costs, it can boost technological innovation performance [57]. Ref. [58] also believe that fulfilling environmental responsibility enables firms to expand R&D investments and ameliorate technological innovation performance. Another way in which CSR facilitates the innovation performance of firms is by establishing trust among internal and external stakeholders of firms [59]. In addition to generating financial rewards for stockholders, CSR performance also provides information about operations and investments, which can increase shareholders' trust in R&D investments [57]. Ref. [60] discovered a favorable correlation between green innovation performance (GIP) and CSR. Ref. [61] suggested that CSR impacts green innovation by influencing the environmental sustainability of organizations. Thus, according to the second research question, we propose the following hypothesis.

Hypothesis 2. *Corporate social responsibility (CSR) performance is positively associated with green innovation performance (GIP).*

2.3. Corporate Financial Performance and Corporate Financial Performance: The Mediating Role of Green Innovation

Knowledge and innovation are essential for corporate performance according to the preponderance of theoretical and empirical studies [62]. Firms innovate to be able to deal with intense competition, shifting consumer demands, and the constant requirement for better products and services [63]. Prevailing research evidence indicates that technological innovation is related to the attainment of either higher performance or competitive advantage [64–66]. Based on an exhaustive literature review, Ref. [67] observed that more than two-thirds of studies reported a positive association between innovation and company performance. Ref. [68] also stated that businesses can increase their profits with their innovative products. Although the majority of the evidence provided by studies seems to buttress a positive relationship between innovation and CFP, we have to keep in mind that the success of innovation is not guaranteed [69] because it is uncertain how customers will react to the new products and services introduced to the markets [70]. A similar relationship regarding green innovation is predicted in the literature. By allocating their

resources to green innovation, companies often experience improved profitability and competitiveness [71].

In order to explain the relationship between GIP and CFP, we can also use the resource-based view of the firm and its extension, the natural-resource-based view of the firm. GIP and related corporate capabilities are intangible resources that, in the short run, are difficult for competitors to imitate. A company's green innovation efforts may make it easier to acquire resources by utilizing them more effectively [72]. Thus, based on the "resource-based view" and the "natural-resource-based view" of the firm, we can expect GIP to have a positive relationship with CFP.

As previously mentioned, numerous studies have provided evidence supporting the positive association between CSR and CFP. If CSR activities can influence a company's green innovation, it is likely that green innovation positively affects CFP [73]. According to [74], companies that prioritize CSR orientation tend to enhance their innovative capabilities, leading to potential reductions in energy and resource usage, as well as improvements in productivity and competitiveness. This discussion suggests that CSR activities have a favorable impact on green innovation, which, in turn, positively influences CFP. In line with the viewpoint of [14], who proposed that intangible factors such as green innovation mediate the relationship between CSR and CFP, we put forth the following hypothesis in conjunction with the third research question:

Hypothesis 3. *Green innovation performance (GIP) mediates the relationship between corporate social responsibility (CSR) performance and corporate financial performance (CFP).*

The proposed conceptual framework of our study is shown in Figure 1.

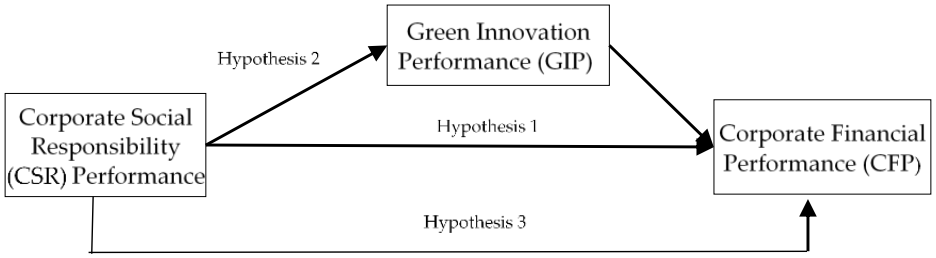

Figure 1. Proposed conceptual framework.

3. Methodology

3.1. Data and Variables

According to prior studies (e.g., [75,76]), which have used ASSET4 database scores to measure CSR, we use the ASSET4 Social Pillar score to measure CSR. The database offers seven scores that measure the social performance of the firm (CSP): product responsibility, community, workforce diversity and opportunity, employment quality, human rights, workforce health and safety, and workforce training and development. In sum, social measures used by this database take into account issues with community and human rights both inside and outside of the company [75]. The ASSET4 database measures environmental performance using three scores: resource reduction, product innovation, and emission reduction. We use the product innovation score to measure firms' GIP.

While most studies have only used measures such as return on assets (ROA), Tobin's Q, and profit margin to measure CFP (e.g., [77,78]), we use the economic pillar score introduced by the ASSET4 database. The economic pillar of the ASSET4 database encompasses three distinct scores: economic performance, shareholder loyalty, and client loyalty. The ASSET4 manual specifies the integration of various firm performance indicators to measure economic performance, including metrics such as operating income change, net income growth, operating profit margin, return on assets (ROA), and sales in USD per employee, among others. Shareholder loyalty is evaluated using metrics such as whether the company has a policy to maintain a loyal shareholder base by abstaining from trading on inside

information (dummy variable), whether the company has a policy to enhance financial transparency (dummy variable), the presence of an audit committee (dummy variable), return on equity (ROE), return on invested capital (ROIC), and current ratio, among others. The final component of the CFP measure adopted in this study is client loyalty, which incorporates measures such as whether the company has a policy to improve consumer satisfaction (dummy variable), whether the company describes processes implemented to enhance consumer satisfaction (dummy variable), marketing expenditures in USD, the total value of the company's brands in USD, and net sales growth in USD, among others. Therefore, the ASSET4 economic pillar not only considers measures frequently used in other studies (including ROA and ROE) but also a more comprehensive set of measures to calculate CFP.

Prior literature also controls for the possible effects of some variables in the link between CSR and CFP. One of the most typical control variables in CSR research is firm size [79]. Larger firms probably have more resources dedicated to CSR [80]. The total assets logarithm is used to measure the firm size in this research [81]. The other control variable is leverage because highly leveraged firms are expected to encounter more significant pressures from creditors to be involved in social initiatives [82]. Because firm age may also influence CSR, we use it as another controlling factor of CSR [83,84]. Hence, we include these variables in our analysis. Table 1 presents a description of our variables.

Table 1. Description of variables.

Variables		
Dependent Variable	CFP	Provided by ASSET4—assesses a company's capacity for resource management that yields a high rate of return and sustainable growth.
Dependent Variable/Independent variable	GIP	Provided by ASSET4—measures company's dedication to advancing eco-efficiency research and development, mirroring a business's ability to lower environmental costs and create new markets with cutting-edge technologies.
Independent variable	CSP	Provided by ASSET4—assesses a company's capacity to foster loyalty and trust among its workforce, clients, and the general public.
Control Variable	Size	Natural logarithm of total assets.
Control Variable	Age	Natural logarithm of years since foundation.
Control Variable	Leverage	Total liabilities to total assets.

We started our sampling process by exporting the data pertaining to the CSP, GIP, and CFP of all the UK firms covered by the database to Excel. The period that we focused on is between 2006 and 2017. The longitudinal dataset contains 2246 observations of 251 firms operating in the UK from 11 different sectors.

3.2. Method

In order to test our hypotheses, we apply two pooled OLS regressions with year and industry fixed effects [85,86]. First, we regressed the CFP against CSP and GIP provided by the ASSET4 database, control variables, and dummy variables of year and industry. Second, we regressed GIP against CSP, control variables, and dummy variables of year and industry. We also excluded the dummy variable for the year 2006 and basic materials industry in order to avoid the dummy variable trap. Our regression models are as follows:

$$\begin{aligned} \text{CFP} = \beta_0 + \beta_1\ \text{CSP} + \beta_2\ \text{GIP} + \beta_3\ \text{Size} + \beta_4\ \text{Age} + \beta_5\ \text{Leverage} + \\ \sum_{6}^{16} \beta_i\ \text{Year Dummy} + \sum_{17}^{26} \beta_j\ \text{Industry Dummy} + \varepsilon \end{aligned}$$

$$\text{GIP} = \beta_0 + \beta_1\ \text{CSP} + \beta_2\ \text{Size} + \beta_3\ \text{Age} + \beta_4\ \text{Leverage} + \sum_{6}^{16} \beta_i\ \text{Year Dummy} + \sum_{17}^{26} \beta_j\ \text{Industry Dummy} + \varepsilon$$

Furthermore, we performed robustness tests to strengthen the validity of our findings. First, we substituted the measure of CFP with other widely used indicators, namely return on assets (ROA) and Tobin's Q, in our initial regression analyses, allowing us to verify whether our conclusions remain consistent when employing alternative and more conventional CFP measures.

Additionally, we employed the generalized method of moments (GMM) to address potential endogeneity issues. By utilizing this approach, we aim to alleviate concerns regarding the bidirectional relationship between variables. This method helps us to account for and mitigate any potential biases arising from endogeneity concerns in our analysis.

4. Results

4.1. Descriptive Statistics

We present descriptive statistics of our main variables in Table 2. The mean of our conceptual framework's variables is 57.39957, 49.37335, and 64.60864 for CFP, GIP, and CSP, respectively, with standard errors of 27.90847, 30.07631, and 24.91368. Table 3 provides a correlation matrix. The results presented in this table indicate that there is a positive and significant correlation between our proposed conceptual framework's variables at a 1% level. Table 3 also shows that our variables of interest are significantly correlated with different firm size, firm age, and leverage. Therefore, we control for their effects in our proposed models.

Table 2. Descriptive statistics.

Variable	N	Mean	S.D.	Min	Q1	Q2	Q3
CFP	2246	57.39957	27.90847	1.24	34.5875	62.165	82.002
GIP	2246	49.37335	30.07631	10.89	20.285	40.645	78.7575
CSP	2246	64.60864	24.91368	5.47	45.845	70.68	85.8825
Size	2246	14.44111	1.613974	9.943237	13.27233	14.30243	15.37664
Age	2246	2.924854	0.907338	−0.3164	2.449232	3.075733	3.738257
Leverage	2246	0.376293	0.184421	0.004939	0.253214	0.352523	0.478328

Table 3. Pearson correlation coefficient matrix.

Variable	VIF	CFP	GIP	CSP	Size	Age	Leverage
CFP	-	1.0 **					
GIP	1.29	0.33 **	1.0 **				
CSP	1.67	0.58 **	0.4 **	1.0 **			
Size	1.43	0.38 **	0.29 **	0.46 **	1.0 **		
Age	1.22	0.32 **	0.23 **	0.32 **	0.16 **	1.0 **	
Leverage	1.24	−0.05 *	−0.02	0.01	−0.01	−0.11 **	1.0 **

Note: * and ** denote statistical significance at the 10% and 1% level, respectively.

4.2. Multivariate Analysis

Table 4 reports the pooled OLS regression analysis results. Regressing the CFP variable against CSP and GIP results in positive and significant (p-value = 0.000) coefficient estimates for both variables (0.4947 and 0.0767, respectively), supporting hypotheses 1 and 3. Table 5 shows the pooled OLS regression results of our second model in which we regressed the GIP against CSP and control variables. As presented in the table, this analysis also results in a positive and significant (p-value = 0.000) coefficient (0.3367) for the CSP variable, supporting our second hypothesis. Thus, our sample of data supports the presented conceptual framework of this study, in line with few research papers that examined this novel conceptual framework [14,77,87].

Table 4. Coefficient estimates of regression model 1 (hypotheses 1 and 3).

	Without Control Variables		With Control Variables	
CFP	**Coefficient (t-Value)**	***p*-Value**	**Coefficient (t-Value)**	***p*-Value**
CSP	0.5969 (27.48)	0.000	0.4947 (21.08)	0.000
GIP	0.1154 (6.66)	0.000	0.0767 (4.49)	0.000
Size	-		2.5802 (7.68)	0.000
Age	-		4.0396 (7.34)	0.000
Leverage	-		−13.5950 (−4.97)	0.000
Industry	Included		Included	
Year	Included		Included	
Constant	Included		Included	
F-value	58.52	0.000	60.87	0.000
Adjusted R-squared	0.3708		0.4095	
Observations	2246		2246	

Table 5. Coefficient estimates of regression model 2 (hypothesis 2).

	Without Control Variables		With Control Variables	
GIP	**Coefficient (t-Value)**	***p*-Value**	**Coefficient (t-Value)**	***p*-Value**
CSP	0.4592 (18.57)	0.000	0.3368 (11.93)	0.000
Size	-		2.9210 (7.09)	0.000
Age	-		3.1868 (4.69)	0.000
Leverage	-		−8.0144 (−2.36)	0.018
Industry	Included		Included	
Year	Included		Included	
Constant	Included		Included	
F-value	24.77	0.000	25.93	0.000
Adjusted R-squared	0.1889		0.2173	
Observations	2246		2246	

4.3. Additional Tests

Following the advice of [88,89] on the significance of triangulation to enhance the robustness of results, we conducted two additional tests: "Alternative Measures of the Dependent Variable" and the "Alternative Estimation Method". By examining the sensitivity of our findings to different measurements of the dependent variable and utilizing a different estimation method, we aimed to address concerns related to endogeneity [90] and ensure the reliability of our results

4.3.1. Alternative Measures of the Dependent Variable

To assess the potential impact of using alternative measures of CFP, we substituted ROA and Tobin's Q with the CFP variable in model 1, as conducted by [75]. The objective was to determine whether our findings would differ when employing different CFP measures. Table 6 presents the results. When ROA was regressed against CSR, green innovation performance (GIP), and our control variables, we observed a confirmed positive and statistically significant relationship between CFP (measured by ROA in this model) and both CSR and GIP.

Table 6. Coefficient estimates of regression model 1 (Hypotheses 1 and 3) using ROA as a measure for CFP.

	Without Control Variables		**With Control Variables**	
CFP (Measured by ROA)	**Coefficient (t-Value)**	***p*-Value**	**Coefficient (t-Value)**	***p*-Value**
CSP	0.0146 (5.91)	0.000	0.0139 (5.04)	0.000
GIP	0.0048 (2.42)	0.016	0.0048 (2.38)	0.018
Size	-		−0.0189 (−0.48)	0.631
Age	-		0.1071 (1.66)	0.097
Leverage	-		0.6318 (1.97)	0.049
Industry	Included		Included	
Year	Included		Included	
Constant	Included		Included	
F-value	4.05	0.000	3.82	0.000
Adjusted R-squared	0.0303		0.0317	
Observations	2246		2246	

We also regressed Tobin's Q against our explanatory and control variables. The results corroborate our initial findings, as shown in Table 7, further substantiating our first and third hypotheses.

Table 7. Coefficient estimates of regression model 1 (Hypotheses 1 and 3) using Tobin's Q as a measure for CFP.

	Without Control Variables		**With Control Variables**	
CFP (Measured by Tobin's Q)	**Coefficient (t-Value)**	***p*-Value**	**Coefficient (t-Value)**	***p*-Value**
CSP	0.0030 (0.93)	0.354	0.0208 (6.04)	0.000
GIP	0.0060 (2.33)	0.020	0.0129 (5.16)	0.000
Size	-		−0.6215 (−12.59)	0.000
Age	-		−0.2501 (−3.10)	0.002
Leverage	-		3.5261 (8.77)	0.000
Industry	Included		Included	
Year	Included		Included	
Constant	Included		Included	
F-value	2.00	0.0032	11.51	0.000
Adjusted R-squared	0.0101		0.1085	
Observations	2246		2246	

4.3.2. Alternative Estimation Method

It is common to anticipate that behaviors and decisions will frequently be dynamic and explicitly influenced by prior behavior. These factors prompt us to make use of dynamic models. The dynamic model in a panel framework is the p^{th}-order autoregression with regressors and a two-way error component structure:

$$Y_{it} = \alpha_1 Y_{i,t-1} + ... + \alpha_p Y_{i,t-p} + X'_{it}\beta + u_i + \lambda_t + \varepsilon_{it}$$

where α_j represents the autoregressive coefficients, X_{it} is a k vector of regressors, u_i is an individual effect, λ_t is a time effect, and ε_{it} is an idiosyncratic error. If $|\alpha| < 1$, the model is stationary. The challenge in utilizing fixed-effects models is that the within operator introduces a correlation between the AR(1) lag and the error term. Consequently, when the time period (T) is fixed, the within estimator becomes inconsistent for the coefficients [90]. The instrumental variables model is limited in that it removes more observations from the model as we incorporate additional lagged variables. On the other hand, the difference GMM methods solely employ difference variables in the model, while the system GMM incorporates both difference variables and level variables as instruments, offering improved

precision and efficiency compared to difference GMM [91]. However, these models, when compared to system GMM, suffer from weak instruments. To address heteroskedasticity in our model, we employ a two-step system GMM estimator. In addition, we utilize Windmeijer's finite-sample correction to obtain more accurate estimates [90]. The results of this approach, which further support our previous findings, are presented in Tables 8 and 9.

Table 8. Coefficient estimates of using system GMM as the method of estimation (hypotheses 1 and 3).

CFP	Coefficient (Z-Statistic)	*p*-Value
Lag (CFP, 1)	0.2780 (7.6072)	0.000
CSP	0.6314 (13.9796)	0.000
GIP	0.1167 (3.1845)	0.001
Size	5.6495 (5.3668)	0.000
Age	−1.8296 (−1.2579)	0.208
Leverage	−39.0763 (−4.3126)	0.000
Industry	Included	
Year	Included	
Constant	Included	
AR(1) *p*-value	0.000	
AR(2) *p*-value	0.46	
Sargan *p*-value	0.31	
Wald chi^2 coef. *p*-value	0.000	
Wald chi^2 time dummies *p*-value	0.000	
Observations	2246	

Table 9. Coefficient estimates of using system GMM as the method of estimation (hypothesis 2).

GIP	Coefficient (Z-Statistic)	*p*-Value
Lag (GIP, 1)	0.6323 (32.8587)	0.000
CSP	0.1655 (5.7050)	0.000
Size	0.2822 (0.4124)	0.68
Age	1.3459 (1.8656)	0.06
Leverage	2.2536 (0.4943)	0.6211
Industry	Included	
Year	Included	
Constant	Included	
AR(1) *p*-value	0.000	
AR(2) *p*-value	0.051	
Sargan *p*-value	0.15	
Wald chi^2 coef. *p*-value	0.000	
Wald chi^2 time dummies *p*-value	0.000	
Observations	2246	

To ensure the validity of the instruments used in our analysis, we employed the Sargan test of overidentifying restrictions, as recommended by [92]. The results indicate that the *p*-value was greater than 0.05, leading us to conclude that the instruments used in our analysis are valid. When applying the Arellano–Bond tests for autocorrelation, we found evidence of first-order autocorrelation but no evidence of second-order autocorrelation. Since we included the first lag of the dependent variable in the model, the presence of first-order autocorrelation was expected and did not pose a significant issue, as stated by [91,93]. The Wald test, a statistical hypothesis test, was employed to determine the significance of a specific set of coefficients or constraints in the regression model, following the approach suggested by [94]. The results indicate that both the coefficients and time dummies were statistically significant. Considering the limited number of instrumental variables, as recommended by [91], we incorporated lags of one to three in this model.

5. Conclusions

This study examines the mediating role of GIP in the link between CSR and CFP using pooled OLS regression models with year and industry fixed effects in UK firms. Using 11 years of data from 2006 to 2017 provided by the ASSET4 database, we found that CSR has a significant positive impact on both CFP and GIP. Furthermore, we found that green innovation plays an important mediating role in the relationship between companies' social responsibility performance and financial performance. By offering an alternate explanation for the relationship between CSR and CFP, our results add to the extant CSR and sustainability literature.

Our study presents several theoretical, practical, policy, and research implications. First, by applying a comprehensive measure of CFP on the theoretical level, we found evidence corroborating that CSR has a positive and significant influence on CFP. This finding helps to alleviate the confusion caused by the mixed results reported by prior studies, since we contend that using a comprehensive measure of CFP allows us to capture all the possible effects of CSR on CFP and, thus, to conciliate mixed results documented in the literature by applying this metric as a measure of CFP.

Second, this study furthers our undestanding of the mediating role of green innovation in the relationship between CSR and CFP. Green innovation, an advanced form of innovation focused on environmentally sustainable practices, has been linked to better financial performance. Previous research suggests that CSR activities can enhance innovation, but the understanding of how CSR influences CFP through innovation is limited. Given the inconsistent and mixed results of prior studies, the aim of this study was to shed light on the mediating role of GIP in the CSR–CFP relationship.

Third, the results are relevant to investors in assessing opportunities and risks associated with CSR and GIP activities in making investment decisions. Hence, investors should be aware of the social and environmental performance of the companies they invest in, since it is crucial to the profitability of those businesses. Managers who seek to improve the financial performance of their companies should also pay extra attention to CSR, as our results support the allocation of the firm's scarce resources to CSR [95,96]. The results suggest that GIP can mediate the link between CSR and CFP; therefore, managers can improve their financial performance by incorporating CSR strategies and green innovation. Consequently, enhanced financial performance leads to a long-term competitive advantage.

Fouth, this study presents policy implications by highlighting the role of GIP in the relationship between CSR performance and CFP as regulators wolrwide address climate change and the move toward mandatory disclosure of CSR performance. This study provides valuable insights into the relationship between green innovation and financial performance before the implementation of EU sustainability disclosure regulations in 2017. This allows for an examination of the voluntary and market-driven nature of green innovation practices and their impact on financial performance within the UK business landscape. By focusing on the UK, conducting a comparative analysis, exploring early adoption dynamics, and highlighting policy implications, this study adds to the understanding of the dynamics between sustainability practices and financial outcomes in the preregulation period.

Finally, we provide evidence on the explanatory power of the instrumental approach to stakeholder theory and the resource-based and natural resource-based views of the firm in explaining the relationship between CSR and CFP.

Our paper is subject to some limitations. This study only provides evidence based on large listed firms. Future research can overcome this limitation by analyzing a sample of small and medium-sized companies. Additionally, the sample of firms we analyzed in this study is confined to the UK context. Future research can improve the generalizability of our findings through replication of the proposed framework using data from other countries.

Author Contributions: Conceptualization, B.M. and S.H.; Methodology, B.M.; Software, M.S.; Validation, M.S.; Formal analysis, B.M. and M.S.; Resources, S.H.; Writing—original draft, B.M. and A.J.; Writing—review & editing, S.H., B.M. and Z.R.; Supervision, B.M. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

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

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