VNU Journal of Economics and Business

Journal homepage: https://jeb.ueb.edu.vn

Original Article

The direct effect of ESG reporting on firm performance: Empirical evidence from global firms during the early years of the green and digital twin transition

Tran Thi Hien[1,*], Pham Thi Song Hanh[2]

[1]*VNU University of Economics and Business*
No. 144 Xuan Thuy Road, Cau Giay District, Hanoi, Vietnam
[2]*University of Leeds*
Leeds, LS2 9JT, United Kingdom

Received: November 13, 2024
Revised: November 25, 2024; Accepted: December 25, 2024

Abstract: Environmental, social, and governance (ESG) data of a firm disclosed to the public in digital platforms in the early years signals that the firm was in their digital and green twin transition. This study seeks to understand if the direct effect of ESG reporting on corporate social responsibility (CFR) is positive and differs between firms in more CSR-sensitive industries and firms in less CSR-sensitive industries that a firm is categorized into, during the early years of the green and digital twin transition. The study uses the 2SLS IV regression method for testing the hypotheses and a global-level dataset of 2,302 firm-year observations of 652 Fortune World's Most Admired firms. The years between 2005 to 2011 were chosen to study as this is in the early period when Bloomberg published ESG data in the Bloomberg data repository. The study finds that the ESG-CFP impact is significant and positive in the groups of industries highly sensitive to CSR but insignificant in the group of industries which is less sensitive to CSR. The paper offers managerial implications.

Keywords: Twin transition, corporate social responsibility, CSR, ESG reporting, firm performance.

1. Introduction

The twin transition strategy enforces the complementary relationship between green and digital transitions (Veugelers et al., 2023). This socio-technical process necessitates a paradigmatic shift to translate policy-related uncertainties into twin transition strategies. The COVID-19 crisis has led to wider recognition of the importance of a sustainable and digital transformation. As a result, scholars are interested in the research question of whether digital and green twin transitions directly help twin firms improve their corporate financial performance (CFP).

* Corresponding author
E-mail address: hientt.hsb@vnu.edu.vn
https://doi.org/10.57110/vnu-jeb.v4i6.359

With this background, this study looks back to the industry practice of ESG data reporting in the early days of global firms. ESG reporting has been commonly used to show evidence of the corporate social responsibility (CSR) performance of firms in the industry. Research shows that ESG disclosure has a significantly favorable effect on CFP (Chen & Xie, 2022). However, the ESG reporting - firm performance link may be subject to the industry context. In this light, our study seeks to understand if a firm's economic outcome of ESG reporting varies following the sensitiveness of the industry toward CSR in an economic uncertainty period. However, the effect of ESG reporting on CFP is unclearly understood and varies among industries as shown in various reviews of the studies on ESG and firm performance (i.e., Li et al., 2024).

This study seeks to understand if the economic outcome of ESG reporting varies following the sensitiveness of the industry toward CSR. Using the global-level data of 652 Fortune World's Most Admired (FWMA) firms, this study finds empirical evidence of the significant and positive effect of CSR on CFP, but the results do not hold for every industry. The effect is sensitive to the industry practice in ESG reporting. The impact is significant and positive in the groups of industries highly sensitive to CSR and insignificant in the group of industries less sensitive to CSR. That is, the impact is clearer for the industries prone to CSR scandals.

This study has two main contributions to the literature. First, this study looks back to the initial period of the green and digital twin transition of global firms to find evidence of the effect of ESG reporting on CFP. The study points to an intriguing concept of "CSR sensitive" vs "CSR non-sensitive" industries which future research could develop further when examining CSR practices. This study sheds more light on the CSR-firm performance relationship by showing that the link is subject to the sensitivity to CSR of industries. This study is among the first to explain that the direct effect of ESG reporting on firm performance is subject to the industry's sensitivity to CSR. Second, the direct impact of E on CFP is not clear but that of ESG is significantly positive and robust. The direct effect of ESG reporting on firm performance is likely significant and positive only in CSR-sensitive industries, and it becomes insignificant in CSR-non-sensitive industries evidenced in the economic recession period. This explanation is justified by analyzing a global-level dataset of the firms pioneering in twinning digital and green technologies.

2. Literature review and hypotheses

2.1. ESG reporting and CFP

ESG reporting can be defined as the information a company discloses about its governance, social, and environmental performance in all forms of corporate reporting to stakeholders. Attention to stakeholder concerns and expectations may help a firm avoid decisions that might prompt stakeholders to undercut or thwart corporate objectives (Wang et al., 2016). As firms' socially responsible behaviours influence a wide range of stakeholder groups, ESG reporting has typically been seen as discretionary in promoting social interests and addressing stakeholder expectations (Zhu et al., 2014). Findings from both marketplace polls and academic research suggest that key stakeholders such as consumers, employees, and investors are more likely to take actions to reward good corporate citizens and punish bad ones (Du et al., 2010).

However, for stakeholders to realize that a firm is a good corporate citizen, the firm needs to communicate with the public about its CSR activities. Without communication, no matter how many CSR initiatives companies develop, the impact of CSR on stakeholder perceptions would be null (Du et al., 2010). Indeed, many scholars applied legitimacy theory to examine the outcomes of ESG reporting as documented in Pérez (2015), a review paper of the literature on the link between corporate reputation and ESG reporting. According to Suchman (1995, p. 574): "Legitimacy is a generalized perception or assumption that the actions of an entity are desirable or appropriate within some socially constructed system of norms, values, beliefs, and definitions." When a firm provides information about its CSR activities, the firm appears to be legitimate in the eyes of the public and their stakeholders, who according to stakeholder theory have the power to influence the achievement of economic outcomes of the firm.

Studies on ethical consumerism suggest consumers increasingly care about the ethical components of products and business processes (Auger et al., 2003). A firm's CSR effort may

serve as an added advantage for the firm and a pre-condition of the firm's benefits, such as a positive response (Sen & Bhattacharya, 2001) and purchase intention (Lee & Shin, 2010). Customers tend to be more satisfied with socially responsible firms (Lee & Heo, 2009). Satisfied customers may result in loyalty (Bolton & Drew, 1991), a willingness to pay a higher price (Homburg et al., 2005), and positive word-of-mouth comments (Szymanski & Henard, 2001). By reporting the information about CSR activities, a company can persuade customers that they are socially responsible. Consequently, ESG reporting may foster customers' loyalty and turn consumers into company/brand ambassadors and champions who engage in advocacy behaviours (Du et al., 2010). As a result, firms may reap a price premium or increase of their market share.

The business rewards of ESG reporting are not confined to the consumer domain but also to other stakeholders, such as employees, investors, and suppliers. The business returns to ESG reporting are contingent on stakeholders' awareness of a firm's CSR activities (Du et al., 2010). CSR communication may help recruit, motivate, and retain good employees. Dutton et al. (1994) demonstrate that employees show greater commitment to a firm that has a good public image in supplying human capital. Moreover, such firms are often perceived as attractive employers by job seekers (Backhaus et al., 2002). Therefore, a firm that releases more CSR information has a higher chance to recruit productive and talented staff, which results in better performance. De Roeck et al.'s (2016) findings from a longitudinal study suggest the long-term impact of employees' perceptions of CSR on their willingness to feel a stronger sense of belonging to their organizations.

Employee engagement is the key to improving CFP. Firms reporting CSR information are more likely to be seen as good corporate citizens, to be able to attract more capital from investors as well as receive more favourable terms from creditors. This is because many individuals likely wish to align their investment with their moral aims (Sprinkle & Maines, 2010). In brief, ESG reporting is likely to stimulate more employees' commitment, attracting more investors and more customers who eventually contribute to good CFP. As such, we propose:

H1: A firm's ESG reporting positively affects CFP.

2.2. CSR-sensitive vs non-sensitive industries

It is worth recalling that empirical evidence about the direct link between ESG reporting and economic performance is inconsistent. Some studies report positive, some find negative and others record no correlation (see the reviews by Abernathy et al., 2017; Brooks & Oikonomou, 2018; Orlitzky et al., 2003; Pérez, 2015; Wang et al., 2016). We argue that the inconsistent findings in the previous studies may arise from the industry context.

Due to differences in the production process, different industries are likely to have different operation practices, leading to potential gaps in the impacts they exert on the natural environment and human and animal welfare. In particular, some industries may cause more harm to the environment and society than others. For example, the tobacco industry is seen as harmful to human health. The automobile, chemical, mining, oil, and gas industries are considered to create a negative impact on the environment (Gopal & Thakkar, 2016; Ranängen & Lindman, 2018; Coraiola & Derry, 2019; Chowdhury et al., 2019). Meanwhile, other industries such as banking and finance, broadcasting, and consulting services may be seen as less harmful to the environment and human and animal life. Therefore, the public may hold a different level of expectation and evaluation of CSR practices by firms in the industry. Accordingly, CSR practices may differ among industries. The industries potentially more harmful to the natural environment or human and animal life are more sensitive to the public's reaction to CSR issues than the industries that are seen as less harmful to the environment or human and animal life. We refer to the former as CSR-sensitive industries and the latter as CSR non-sensitive industries.

Firms in CSR-sensitive industries are likely to attract attention from the public about their CSR performance. Therefore, in those industries, the firms that report more CSR information would meet the public's expectation of the firm and consequently obtain favour from the stakeholders who subsequently reward the firms for being good corporate citizens. The studies of firms in automobiles (Gopal & Thakkar, 2016), tobacco (Coraiola & Derry, 2019), and oil and gas, (Chowdhury et al., 2019) suggest a significant and positive effect of ESG

reporting on CFP. Meanwhile, firms in CSR non-sensitive industries are less likely to attract attention from the public about their CSR performance than the CSR-sensitive industries. Consequently, the latter's effort in CSR performance and reporting may not get rewarded as much as ESG reporting in the CSR-sensitive industries. Taken together, we propose that:

H2: The positive effect of ESG reporting on CFP in CSR-sensitive industries is more pronounced than that in CSR-non-sensitive industries.

3. Research method

3.1. Estimation model

$$Performance_{i,t} = \beta_0 + \beta_1 CSRreporting_{i,t-1} + \beta_2 Industryaverage_{i,t-1} + \beta_3 Insitution_{i,t-1} + \beta_4 Sales_{i,t-1} + \beta_5 Asset_{i,t-1} + \beta_6 CEOduality_{i,t-1} + \beta_7 Bindependence_{i,t-1} + \beta_8 Leverage_{i,t-1} + \beta_9 Crisis + \beta_{10} Countrydummy_{it} + \beta_{11} Yeardummy_{it} + \varepsilon_{it} \quad (1)$$

CFP (Performance) was alternatively measured by Tobin's Q, ROA, and ROE. These indicators are the most common indicators used to reflect a firm's performance in many prior studies such as Rashid (2015).

ESG reporting (*ESGreporting*) is proxied by ESG disclosure scores calculated by Bloomberg (Lai et al., 2016) based on the amount of environmental, social, and governance (ESG) information that a company disclosed. The scores span from 0.1 for firms that revealed a minimum amount of data to 100 for those that communicated every data point.

Control variables

Industry performance (Industryaverage): The industry of a firm is an essential part of the business environment which frames organizational competition strategies and practices. Specifically, the heterogeneity in industry structures is likely to contribute to variations in the CFP in different industries. Thus, we controlled the industry to capture the industry effect as conventionally done in previous studies on CFP, such as Datta et al. (2005). Following Le and O'Brien (2010), the industry effect was captured through the industry's average performance measured by median CFP for each industry in a year.

Institution: Institutions are the constraints that structure political, economic, and social interactions (Hodgson, 2006). Thus, we control for the effect of the institution on the firm's reputation and performance.

Sales: Sale performance is a crucial part of determining the CFP of the firm (Davis & Albright, 2004).

Asset: Firm size has long been cited as a potential determinant of CFP. We captured firm size with total assets as done by previous research such as Rashid (2015).

CEO duality (*CEOduality):* When the CEO is also a board chair of a firm, this may help establish strong, unambiguous leadership, but it may also promote CEO entrenchment (Peng, 2004). Given the unresolved relationship between CEO duality and CFP (Boyd, 1990), we include CEO duality as a control variable.

Board independence (Bindependence) has long been posited as a potential determinant of CFP because it helps to address the agency problem in a public corporation where ownership and management are separated. We measured board independence by the proportion of independent directors on the board (Rashid, 2015).

Financial leverage (Leverage): Debt finance provides an alternative and complementary control mechanism to managerial equity ownership and family ownership for reducing agency costs of a firm (Seetharaman et al., 2001) and thus potentially influencing CFP. Financial leverage was popularly controlled in previous studies of the link between corporate governance and CFP (Henry, 2010).

Crisis (Crisis): As our dataset spans the global financial crisis, 2007-2008, we added the shock to the model by using a dummy variable, *Crisis*, for control. *Crisis* takes the value equal to 1 for the 2007-2008 observations and 0 for other year observations.

Country effect (Countrydummy): Home country factors may influence CFP due to the heterogeneity in demand and capital costs among countries. To capture the time effect, we also control for the year effect (*Yeardummy*) in the model.

CSR sensitive vs non-sensitive industries

Colombo et al. (2019) argue that CSR can be an area under which issues traditionally negotiated by companies and unions (e.g. health and safety issues) and issues of interest of both parties (e.g. environmental issues) might be framed. CSR can be a platform for current and new negotiations among social partners, which might provide them with a "'humus for

cooperation"' (Colombo et al., 2019). Accordingly, the average level of ESG reporting in one industry can reflect the level of sensitivity of the public to the industry's CSR practices. Therefore, we divide the samples into CSR-sensitive vs non-sensitive industries by the cut-off between the median value of ESG reporting.

3.2. Data

We selected a sample of the firms from the Fortune World's Most Admired (FWMA) rating list. The 2005-2011 data for the home country and industry of a firm, and data for financial soundness reputation rating of a firm were manually collected from the FWMA website. The years 2005-2011 is the early period in which Bloomberg published ESG reporting data in the Bloomberg data repository.

ROA and ROE, market value and total assets for calculation of Tobin's Q, and the aggregated environmental, social, and governance disclosure score, percentage of independent board members, debt-to-equity ratio, and total sales from 2005 to 2011 were collected from Bloomberg. After that, we checked CEO duality in company annual reports and collected data for the institution score of each country in the dataset from the Global Competitiveness Reports published by the World Economic Forum.

After deleting the observations that have the missing data for the variables of the model, there are 2,302 firm-year observations from 652 companies left in the final dataset, including 30 industries in 29 countries.

4. Results and interpretation

4.1. Descriptive statistics and correlation matrix

Regarding the total assets of the firms, the mean average total asset is 78,229.58 million USD. The mean average number of employees of a firm is 66.805 staff while ROA and ROE are respectively 5.30 and 15.37 percent on the mean average. Tobin's Q ranges from -0.05 to 9.40 and has a mean of 1.31. At first glance, there is no significant bivariate correlation between *ESGreporting* and CFP.

Figure 1 shows the mean ESG reporting level of firms in each of the 30 industries. The top 10 industries reporting CSR include Chemicals, Automobile, Tobacco, Beverages & Brewery, Telecom, Electronics, Metal and Mining, Oil and Gas, Machinery and equipment, and Engineering/R&D Services. The pattern that emerged from the bar chart demonstrates that the top ESG reporting firms are in heavy industries and the Tobacco and Beverages & Breweries, which are all related to environmental harm and/or controversial industries (Leung & Snell, 2017). The 10 industries with the lowest ESG reporting level include Distribution/Wholesale/Commerce, Agriculture, Consulting Services, Broadcasting Audio-Video Publishing, Human Resources, Real estate, Hotel, Retail, and Others. Among these, Distribution/Wholesale/Commerce reports the least information on CSR; this is because, possibly, this sector has the least direct contact with consumers.

The mean VIFs are 1.45 [1.46] [1.44] when ROA, ROE, and Tobin's Q are alternatively the dependent variables, all well below the rule-of-thumb value of 4. This demonstrates that the assumption of no perfect multicollinearity is not seriously violated.

4.2. Endogeneity

The IV 2SLS regression method was used to address the potential problem (Wooldridge, 2013). We employ the sound financial reputation of a firm (*Soundfinance*) as the instrument variable of *ESGreporting*. Firms that are transparent in disclosing CSR information are usually transparent in financial health, hence have a good reputation in financial soundness. *Soundfinance* is correlated with *ESGreporting* but uncorrelated with the error term.

To check if *ESGreporting* is exogenous, we conducted the Durbin (score) chi-sq test and Wu-Hausman F test of endogeneity of *ESGreporting.* The large P-values obtained from these tests show that the hypothesis of an exogenous regressor cannot be rejected ($p > 0.1$). The first-stage regression summary statistics of the Wald test show that $p < 0.05$, indicating that the instrument variable is not weak.

As seen in Table 2, there is statistical evidence that ESG reporting has a positive effect on firm CFP, ROA, ROE, and Tobin's Q respectively in the whole sample ($\beta = 0.123$, P value = 0.000 in Model 1; $\beta = 0.364$, P value =

0.008 in Model 2; β = 0.003, P value = 0.357 in Models 3). Therefore, H1 is accepted.

Table 3 shows that the effect of *ESGreporting* on ROA[ROE] [Tobin's Q] varies between the firms in the industries that have the practice of above-average ESG reporting, i.e., median and above of the ESG reporting level and the firms in the industries that have the practice of below-average ESG reporting, i.e., below the median of the ESG reporting level. Specifically, the sign and significant level changes between the above-median group (β = 0.141, P = 0.004 in Model 4; β = 0.246, P = 0.154 in Model 5; β = 0.009, P = 0.073 in Model 6) and below-median group (β = -0.047, P = 0.760 in Model 7; β = -0.226, P = 0.732 in Model 8; β = -0.010, P= -0.590 in Model 9). The result is sensitive, turning from positive in the above-median group to a negative sign in the below-median group.

Consequently, H2 is supported only in the subset of the firms in the industries that have the practice of above-average ESG reporting, i.e., median and above of the ESG reporting level. These industries are commonly viewed as CSR hotspots or controversial industries, i.e., automobile, (Gopal & Thakkar, 2016), chemicals (Colombo et al., 2019), metal and mining (Ranängen, & Lindman, 2018), tobacco (Coraiola & Derry, 2019), and oil and gas (Chowdhury et al., 2019).

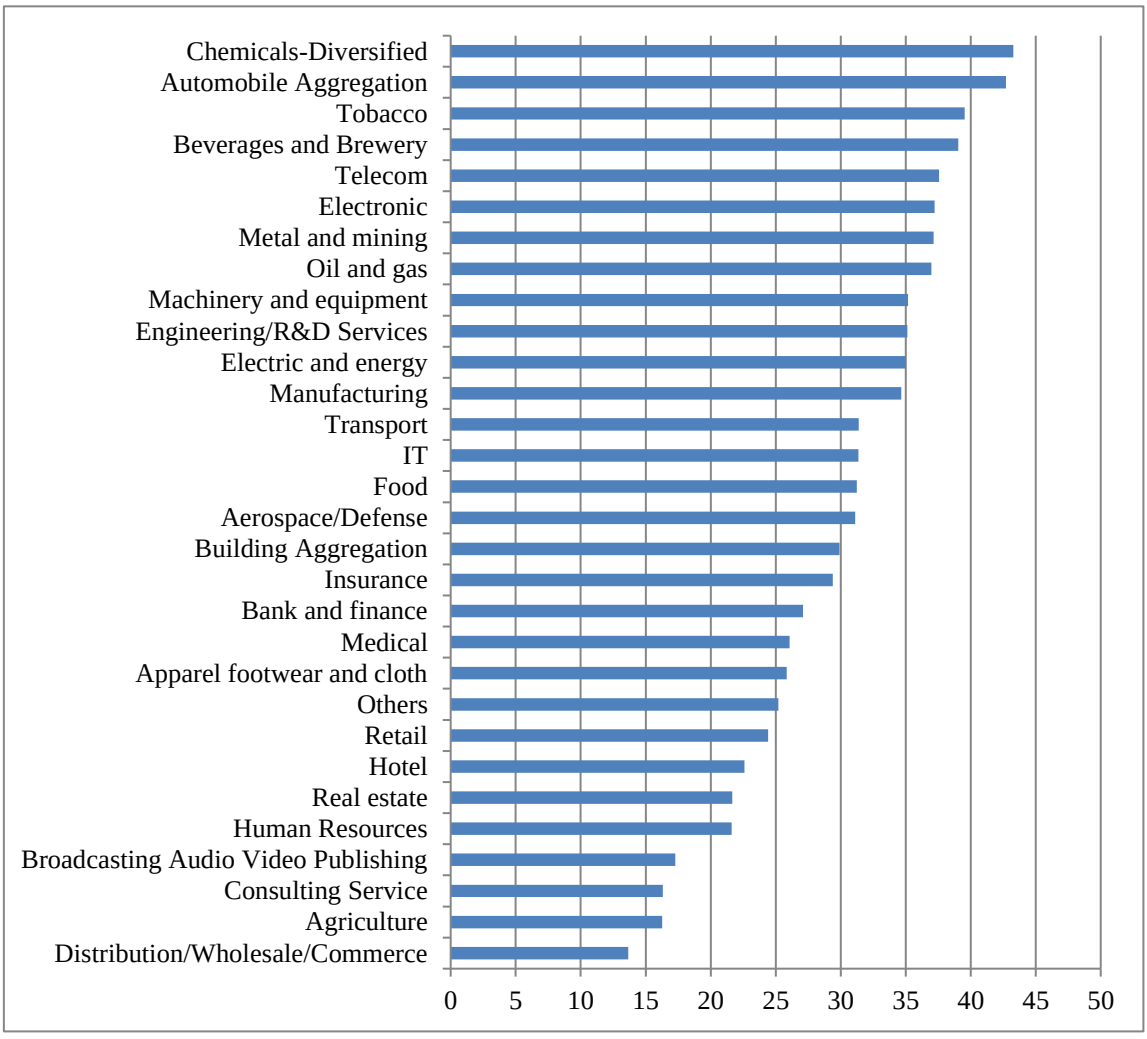

Figure 1: Means of ESG reporting level in each industry

Source: Authors' calculation.

Table 1: Descriptive statistics and correlation matrix

	Variable	Mean	S.D.	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12	13
1	ROA	5.30	7.09	-56.13	38.73	1.00												
2	ROE	15.37	26.47	-200.77	433.12	0.67***	1.00											
3	TobinQ	1.31	0.83	-0.05	9.40	0.58***	0.35***	1.00										
4	ESGreporting	31.35	15.30	1.51	79.75	-0.00	0.00	-0.13***	1.00									
5	Industryaverage	5.15	2.16	1.33	9.15	0.34***	0.16***	0.26***	0.05*	1.00								
6	Institution	5.42	0.42	3.70	6.50	0.06**	0.04	0.14***	0.01	-0.01	1.00							
7	Sales	33.93	47.38	-19.02	433.53	0.02	0.01	-0.14***	0.32***	-0.01	0.03	1.00						
8	Asset	10.18	1.46	6.48	15.07	-0.17***	-0.10***	-0.28***	0.40***	-0.32***	0.06**	0.60***	1.00					
9	CEOduality	0.72	0.45	0.00	1.00	0.13***	0.11***	0.29***	-0.43***	0.10***	0.01	-0.17***	-0.28***	1.00				
10	Boardindepent	73.17	22.68	0.00	100.00	0.11***	0.11***	0.19***	-0.23***	0.09***	0.09***	-0.08***	-0.11***	0.61***	1.00			
11	Leverage	4.08	1.38	-6.39	9.76	-0.32***	0.00	-0.20***	0.06**	-0.27***	0.06**	0.03	0.23***	0.02	0.01	1.00		
12	Crisis	0.20	0.40	0.00	1.00	-0.10***	-0.09***	-0.12***	-0.01	-0.05*	-0.08***	-0.00	-0.01	-0.02	-0.03	0.06**	1.00	
13	Soundfinance	11.75	3.61	1.00	17.00	0.04	0.04	0.08***	-0.13***	0.04*	-0.01	-0.08***	-0.09***	0.26***	0.18***	-0.01	-0.02	1.00

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

Source: Authors' calculation.

4.3. Regression results

Table 2: The direct effect of ESG reporting on CFP - 2SLS IV results (Hypothesis 1)

Baseline	**Model 1**	**Model 2**	**Model 3**	**Robustness check**	**Model 1***	**Model 2***	**Model 3***
	ROA	*ROE*	*TobinQ*		*ROA*	*ROE*	*TobinQ*
L.ESGreporting	**0.123*****	**0.364*****	**0.003**	***L2.ESGreporting***	**0.115*****	**0.225**	**0.006**
	(0.000)	(0.008)	(0.357)		(0.003)	(0.137)	(0.164)
L.Industryaverage	0.594***	1.164***	0.043***	*L2.Industryaverage*	0.565***	1.586***	0.032**
	(0.000)	(0.005)	(0.000)		(0.000)	(0.000)	(0.011)
L.Institution	0.497	1.453	0.253***	*L2.Auditstrength*	-0.586	-1.635	0.125**
	(0.263)	(0.422)	(0.000)		(0.196)	(0.355)	(0.015)
L.Sales	0.009**	0.045**	-0.000	*L2.Sales*	0.007	0.021	-0.000
	(0.032)	(0.012)	(0.518)		(0.157)	(0.243)	(0.553)
L.Asset	-0.754***	-3.945***	-0.076***	*L2.Asset*	-0.661***	-2.130**	-0.098***
	(0.000)	(0.000)	(0.000)		(0.003)	(0.015)	(0.000)
L.CEOduality	3.045***	6.093**	0.465***	*L2.CEOduality*	3.072***	4.735	0.443***
	(0.000)	(0.022)	(0.000)		(0.000)	(0.104)	(0.000)
L.Boardindepent	0.019**	0.132***	0.001	*L2.Boardindepent*	0.012	0.101**	0.001
	(0.035)	(0.000)	(0.379)		(0.239)	(0.013)	(0.543)
L.Leverage	-1.022***	2.653***	-0.062***	*L2.Leverage*	-0.944***	1.501***	-0.042***
	(0.000)	(0.000)	(0.000)		(0.000)	(0.005)	(0.005)
Crisis	-2.073***	-7.403***	-0.273***	*Crisis*	-1.376**	-5.166**	-0.023
	(0.000)	(0.001)	(0.000)		(0.033)	(0.040)	(0.746)
N	2,302	2,302	2,302		2,302	2,302	2,302
R^2	0.162	0.068	0.176		0.167	0.065	0.151

Note: p-values in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01.

L.: 1-year lagged data of the independent variables; L2: 2-year lagged data of the independent variables.

Source: Authors' calculation.

Table 3: The effect of ESG reporting on CFP in CSR sensitive vs non-sensitive industrial (Hypothesis 2)

	Median and above of ESG reporting level			**Below median of ESG reporting level**		
	Model 4	**Model 5**	**Model 6**	**Model 7**	**Model 8**	**Model 9**
	ROA	*ROE*	*TobinQ*	*ROA*	*ROE*	*TobinQ*
L.ESGreporting	**0.141*****	**0.246**	**0.009***	**-0.047**	**-0.226**	**-0.010**
	(0.004)	(0.154)	(0.073)	(0.760)	(0.732)	(0.590)
L.Industryaverage	0.616***	1.870***	0.049***	0.577***	1.358*	0.007
	(0.000)	(0.000)	(0.001)	(0.001)	(0.061)	(0.727)
L.Institution	-0.152	0.744	0.147***	-2.099**	-8.447*	-0.005
	(0.777)	(0.696)	(0.008)	(0.042)	(0.056)	(0.970)
L.Sales	0.002	0.013	-0.001	0.016*	0.044	0.000
	(0.693)	(0.527)	(0.213)	(0.093)	(0.265)	(0.854)
L.Asset	-0.469	-1.737*	-0.075**	-0.801***	-2.323*	-0.144***
	(0.102)	(0.091)	(0.010)	(0.007)	(0.070)	(0.000)
L.CEOduality	3.462***	6.988***	0.501***	-0.898	-9.938	0.212
	(0.000)	(0.005)	(0.000)	(0.658)	(0.252)	(0.414)
L.Boardindepent	0.009	0.048	0.001	0.018	0.272***	0.000
	(0.448)	(0.233)	(0.571)	(0.478)	(0.010)	(0.942)
L.Leverage	-1.028***	0.910	-0.046***	-0.725***	2.527**	-0.018
	(0.000)	(0.146)	(0.009)	(0.002)	(0.014)	(0.522)
Crisis	-2.106**	-9.335***	-0.090	0.210	1.788	0.134
	(0.010)	(0.001)	(0.278)	(0.852)	(0.710)	(0.341)
N	1,150	1,150	1,150	1,152	1,152	1,152
R^2	0.181	0.087	0.218	0.138	0.057	0.058

Note: p-values in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01.

Source: Authors' calculation.

Table 4: Robustness check (Hypothesis 2)

	Top 10 industries sensitive to CSR			**Middle 10 industries sensitive to CSR**			**Lowest 10 industries sensitive to CSR**		
	Model 10	**Model 11**	**Model 12**	**Model 13**	**Model 14**	**Model 15**	**Model 16**	**Model 17**	**Model 18**
	ROA	*ROE*	*TobinQ*	*ROA*	*ROE*	*TobinQ*	*ROA*	*ROE*	*TobinQ*
L.ESGreporting	**0.092****	**0.207**	**0.000**	**0.100****	**0.353**	**-0.004**	**-0.033**	**-0.083**	**-0.003**
	(0.036)	(0.144)	(0.949)	(0.046)	(0.172)	(0.544)	(0.838)	(0.859)	(0.864)
L.Industryaverage	0.648***	1.729***	0.072***	0.636***	0.734	0.053***	0.734**	1.681*	0.008
	(0.000)	(0.003)	(0.000)	(0.000)	(0.280)	(0.002)	(0.021)	(0.065)	(0.798)
L.Institution	-0.593	-0.972	0.145***	1.557***	3.815	0.337***	1.108	3.216	0.404**
	(0.396)	(0.667)	(0.008)	(0.007)	(0.196)	(0.000)	(0.534)	(0.525)	(0.029)
L.Sales	0.006	0.007	-0.001**	0.016*	0.136***	-0.001	0.019*	0.054*	0.001
	(0.403)	(0.757)	(0.017)	(0.092)	(0.004)	(0.469)	(0.093)	(0.088)	(0.206)
L.Asset	-0.327	-0.007	0.064	-0.761***	-6.250***	-0.055*	-0.768	-2.624	-0.212**
	(0.523)	(0.997)	(0.112)	(0.001)	(0.000)	(0.065)	(0.377)	(0.293)	(0.018)
L.CEOduality	2.682***	7.142**	0.479***	2.938***	5.641	0.338***	-0.170	-5.832	0.379
	(0.002)	(0.012)	(0.000)	(0.001)	(0.226)	(0.004)	(0.956)	(0.511)	(0.249)
L.Boardindepent	0.011	0.059	-0.001	0.019	0.166**	0.002	0.039	0.140	0.001
	(0.422)	(0.197)	(0.536)	(0.138)	(0.011)	(0.207)	(0.355)	(0.247)	(0.755)
L.Leverage	-1.296***	0.681	-0.072***	-0.947***	3.561***	-0.044**	-1.142***	-0.035	-0.111***
	(0.000)	(0.389)	(0.000)	(0.000)	(0.000)	(0.031)	(0.005)	(0.976)	(0.010)
Crisis	-1.955*	-7.857**	-0.268***	-1.898***	-7.786**	-0.303***	-5.003***	-12.708***	-0.474***
	(0.051)	(0.016)	(0.001)	(0.003)	(0.019)	(0.000)	(0.003)	(0.008)	(0.006)
N	712	712	712	1,191	1,191	1,191	399	399	399
R^2	0.165	0.079	0.272	0.216	0.093	0.143	0.176	0.106	0.169

Note: p-values in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01.

Source: Authors' calculation.

4.4. Robustness check

For the result of testing H1, the IV 2SLS regressions were run using two-year lagged data of the independent variables of Equation (1); the robustness checking result almost holds (see Model 1*, Model 2*, and Model 3* in Table 2).

To check the robustness of the result of testing H2, the whole sample was divided into three sub-samples, based on the mean level of ESG reporting of firms in each of the industries, which includes a group of the 10 industries that have the smallest means, a group of the 10 industries that have largest means, and a group of the rest in Figure 1. Most of the 2SLS IV regression results for robustness check hold (see Models 10-18 in Table 4).

Three sub-samples were segregated from the whole sample, based on the mean value of ESG disclosure score of the firms in an industry.

5. Discussions and conclusion

Whether the outcomes of the green and digital twin transition directly contributed to a firm's financial performance is a critical question. Despite a large volume of research examining the ESG-CFP relation, limitations of this literature include the use of localized samples, poorly specified control variables, and self-constructed ESG data disclosure measures that may not represent a firm's actual CSR performance (Beck et al., 2018). This study extends the analysis using a global data set to examine the relationship between ESG reporting and CFP of firms from 30 countries. We find evidence of a significant and positive relationship between ESG reporting and CFP. To ensure the provision of more conclusive findings, we do not stop here but consider the impact in different industry contexts which are categorized into CSR-sensitive industries and CSR-non-sensitive industries.

Our results show that the effect of ESG data reporting on CFP is more pronounced in CSR-sensitive industries than that in CSR non-sensitive industries. Specifically, the effect is significant and positive in CSR-sensitive industries while it is insignificant in CSR-non-sensitive industries. Looking in more detail, the impact tends to be significant and positive in the higher range of ESG reporting industries, but the sign of the impact appears inconsistent in the lower range of ESG reporting industries. It is noteworthy that the impact becomes insignificant and seems contrary in the ten lowest ESG reporting industries consistently. Our findings support the argument made by several scholars (i.e. Davidson 2016, Wang et al. 2016; Brooks & Oikonomou, 2018) that CSR is a highly contextual and contingent concept. Based on our results, we suggest that omitting the role of the industry in the ESG-CFP link may be the reason for inconclusive findings in the existing literature.

The study offers important implications for practices. We strongly suggest that firms in CSR highly sensitive industries should engage in ESG reporting as this helps the public have more information of the CSR issues in these industries. Therefore, ESG reporting becomes strategic CSR for improving the CFP of these firms. For the firms in CSR low-sensitive industries, the financial outcome of ESG reporting is not clear. We warn the firms in CSR low-sensitive industries that it is not efficient to use CSR communication as an instrument to achieve good economic outcomes because these industries do not ring a bell to the public. In the CSR non-sensitive industries, maybe, ESG reporting can be merely driven by the moral values of managers who believe.

The study has certain limitations. First, the study omits some variables popularly used as control variables in the literature on CFP such as firm age, R&D, and advertising expenditure, and in corporate governance literature such as board diversity, ownership structure, and institutional shareholders were not controlled because data was not available. Further studies should seek to collect the data for these control variables. Second, the use of the median value of ESG reporting level of firms in each industry as a cut-off point to categorize the industries into CSR sensitive vs non-sensitive industries may not be perfect criteria. The notion of CSR-sensitive vs non-sensitive industries is a new concept that needs further development in terms of identifying which industry highly attracts the public's attention to the CSR practices of the firms.

References

Abernathy, J., Stefaniak, C., Wilkins, A., & Olson, J. (2017). Literature review and research opportunities on the credibility of corporate social responsibility reporting. *American Journal of Business, 32*(1), 24-41. https://doi.org/10.1108/AJB-04-2016-0013

Auger, P., Burke, P., Devinney, T. M., & Louviere, J. J. (2003). What will consumers pay for social product features? *Journal of Business Ethics, 42*(3), 281-304. https://doi.org/10.1023/A:1022212816261

Backhaus, K. B., Stone, B. A., & Heiner, K. (2002). Exploring the relationship between corporate social performance and employer attractiveness. *Business & Society, 41*(3), 292-318. https://doi.org/10.1177/0007650302041003003

Beck, C., Frost, G., & Jones, S. (2018). CSR disclosure and financial performance revisited: A cross-country analysis. *Australian Journal of Management, 43*(4), 517-537. https://doi.org/10.1177/0312896218771438

Bolton, R. N. & Drew, J. H. (1991). A longitudinal analysis of the impact of service changes on customer attitudes. *Journal of Marketing, 55*(1), 1-9. https://doi.org/10.1177/002224299105500101

Boyd, B. (1990). Corporate linkages and organizational environment: A test of the resource dependence model. *Strategic Management Journal, 11*(6), 419-430. https://doi.org/10.1002/smj.4250110602

Brooks, C., & Oikonomou, I. (2018). The effects of environmental, social and governance disclosures and performance on firm value: A review of the literature in accounting and finance. *The British Accounting Review, 50*(1), 1-15. https://doi.org/10.1016/j.bar.2017.11.005

Chen, Z., & Xie, G. (2022). ESG disclosure and financial performance: Moderating role of ESG investors. *International Review of Financial Analysis, 83*, 102291. https://doi.org/10.1016/j.irfa.2022.102291

Chowdhury, R. H., Choi, S., Ennis, S. & Chung, D. (2019). Which dimension of corporate social responsibility is a value driver in the oil and gas industry? *Canadian Journal of Administrative Sciences, 36*(2), 260-272. https://doi.org/10.1002/cjas.1492

Colombo, S., Guerci, M., & Miandar, T. (2019). What do unions and employers negotiate under the umbrella of corporate social responsibility? Comparative evidence from the Italian metal and chemical industries. *Journal of Business Ethics, 155*(2), 445-462. https://doi.org/10.1007/s10551-017-3503-9

Coraiola, D. M., & Derry, R. (2019). Remembering to forget: The historic irresponsibility of US big tobacco. *Journal of Business Ethics*, https://doi.org/10.1007/s10551-019-04323-4

Datta, D. K., Guthrie, J. P., & Wright, P. M. (2005). Human resource management and labor productivity: Does industry matter? *Academy of Management Journal, 48*(1), 135-145. https://doi.org/10.5465/amj.2005.15993158

Davidson, D. K. (2016). The importance of context in understanding CSR. In Örtenblad, A. (Ed.). (2016). *Research Handbook on Corporate Social Responsibility in Context (pp. 32-45)*. Edward Elgar Publishing. https://doi.org/10.4337/9781783474806.00011

Davis, S., & Albright, T. (2004). An investigation of the effect of balanced scorecard implementation on financial performance. *Management Accounting Research, 15*(2), 135-153. https://doi.org/10.1016/j.mar.2003.11.001

De Roeck, K., El Akremi, A., & Swaen, V. (2016). Consistency matters! How and when does corporate social responsibility affect employees' organisational identification? *Journal of Management Studies, 53*(7), 1141-1168. https://doi.org/10.1111/joms.12216

Du, S., Bhattacharya, C. B., & Sen, S. (2010). Maximising business returns to corporate social responsibility (CSR): The role of CSR communication. *International Journal of Management Reviews, 12*(1), 8-19. https://doi.org/10.1111/j.1468-2370.2009.00276.x

Dutton, J. E., Dukerich, J. M., & Harquail, C. V. (1994). Organisational images and member identification. *Administrative Science Quarterly, 39*(2), 239-263. https://doi.org/10.2307/2393235

Gopal, P., & Thakkar, J. (2016). Sustainable supply chain practices: An empirical investigation on Indian automobile industry. *Production Planning & Control, 27*(1), 49-64. https://doi.org/10.1080/09537287.2015.1060368

Henry, D. (2010). Agency costs, ownership structure and corporate governance compliance: A private contracting perspective. *Pacific-Basin Finance Journal, 18*(1), 24-46. https://doi.org/10.1016/j.pacfin.2009.05.004

Hodgson, G. M. (2006). What are institutions? *Journal of Economic Issues, 40*(1), 1-25. https://doi.org/10.1080/00213624.2006.11506879

Homburg, C., Hoyer, W. D., & Koschate, N. (2005). Customers' reactions to price increases: Do customer satisfaction and perceived motive fairness matter? *Journal of the Academy of Marketing Science, 33*(1), 36-49. https://doi.org/10.1177/0092070304269953

Kong, Y., Antwi-Adjei, A., & Bawuah, J. (2020). A systematic review of the business case for corporate social responsibility and firm performance. *Corporate Social Responsibility and Environmental Management, 27*(2), 444-454. https://doi.org/10.1002/csr.1838

Le, T. V., & O'Brien, J. P. (2010). Can two wrongs make a right? State ownership and debt in a transition economy. *Journal of Management Studies*, 47(7), 1297-1316. https://doi.org/10.1111/j.1467-6486.2010.00916.x

Lee, K.-H., & Shin, D. (2010). Consumers' responses to CSR activities: The linkage between increased awareness and purchase intention. *Public Relations Review*, *36*(2), 193-195. https://doi.org/10.1016/j.pubrev.2009.10.014

Lee, S., & Heo, C. Y. (2009). Corporate social responsibility and customer satisfaction among US publicly traded hotels and restaurants. *International Journal of Hospitality Management*, *28*(4), 635-637. https://doi.org/10.1016/j.ijhm.2009.02.007

Leung, T. C. H., & Snell, R. S. (2017). Attraction or distraction? Corporate social responsibility in Macao's gambling industry. *Journal of Business Ethics*, *145*(3), 637-658. https://doi.org/10.1007/s10551-015-2890-z

Li, L., Saat, M. M., Khatib, S. F., Chu, P., & Sulimany, H. G. H. (2024). Navigating the impact: A comprehensive analysis of ESG disclosure consequences through systematic review. *Business Strategy & Development*, *7*(2), e382. https://doi.org/10.1002/bsd2.382

Orlitzky, M., Schmidt, F. L., & Rynes, S. L. (2003). Corporate social and financial performance: A meta-analysis. *Organization Studies*, *24*(3), 403-441. https://doi.org/10.1177/0170840603024003910

Peng, M. W. (2004). Outside directors and firm performance during institutional transitions. *Strategic Management Journal*, *25*(5), 453-471. https://doi.org/10.1002/smj.390

Pérez, A. (2015). Corporate reputation and ESG reporting to stakeholders: Gaps in the literature and future lines of research. *Corporate Communications: An International Journal*, *20*(1), 11-29. https://doi.org/10.1108/CCIJ-01-2014-0003

Ranängen, H., & Lindman, Å. (2018). Exploring corporate social responsibility practice versus stakeholder interests in Nordic mining. *Journal of Cleaner Production*, *197*, 668-677. https://doi.org/10.1016/j.jclepro.2018.06.159

Rashid, A. (2015). Revisiting agency theory: Evidence of board independence and agency cost from Bangladesh. *Journal of Business Ethics*, *130*, 181-198. https://doi.org/10.1007/s10551-014-2211-y

Seetharaman, A., Swanson, Z. L., & Srinidhi, B. (2001). Analytical and empirical evidence of the impact of tax rates on the trade-off between debt and managerial ownership. *Journal of Accounting, Auditing & Finance*, *16*(3), 249-272. https://doi.org/10.1177/0148558X0101600306

Sen, S., & Bhattacharya, C. B. (2001). Does doing good always lead to doing better? Consumer reactions to corporate social responsibility. *Journal of Marketing Research*, 38(2), 225-243. https://doi.org/10.1509/jmkr.38.2.225.18838

Sprinkle, G. B., & Maines, L. A. (2010). The benefits and costs of corporate social responsibility. *Business Horizons*, *53*(5), 445-453. https://doi.org/10.1016/j.bushor.2010.05.006

Suchman, M. C. (1995). Managing legitimacy: Strategic and institutional approaches. *Academy of Management Review*, *20*(3), 571-610. https://doi.org/10.5465/amr.1995.9508080331

Szymanski, D. M., & Henard, D. H. (2001). Customer satisfaction: A meta-analysis of the empirical evidence. *Journal of the Academy of Marketing Science*, *29*(1), 16-35. https://doi.org/10.1177/009207030102900102

Ullmann, A. A. (1985). Data in search of a theory: A critical examination of the relationships among social performance, social disclosure, and economic performance of US firms. *Academy of Management Review*, *10*(3), 540-557. https://doi.org/10.5465/amr.1985.4278989

Veugelers, R., Faivre, C., Rückert, D., & Weiss, C. (2023). The green and digital twin transition: EU vs US firms. *Intereconomics*, *58*(1), 56-62. https://doi.org/10.2478/ie-2023-0010

Wang, Q., Dou, J., & Jia, S. (2016). A meta-analytic review of corporate social responsibility and corporate financial performance: The moderating effect of contextual factors. *Business & Society*, *55*(8), 1083-1121. https://doi.org/10.1177/0007650315584317

Wooldridge, J. M. (2013). Econometrics: A modern approach. *South-Western*.

Zhu, Y., Sun, L.-Y. & Leung, A. S. (2014). Corporate social responsibility, firm reputation, and firm performance: The role of ethical leadership. *Asia Pacific Journal of Management*, *31*(4), 925-947. https://doi.org/10.1007/s10490-013-9369-1