Corporate social responsibility and firm performance: a threshold analysis of European firms

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Abstract

Purpose – This paper aims to investigate the reciprocal nonlinear relationship between corporate social responsibility (CSR) and firm performance (FP).

Design/methodology/approach – The authors used a sample of 814 European firms over the period 2008–2017. The Panel Smooth Transition Regression (PSTR) model was performed as an econometric approach.

Findings – Firstly, results show a threshold effect in the CSR–FP relationships within the two directions. More specifically, the authors found that firms are more likely to engage in CSR by surpassing a threshold of 1.231% for return on assets (ROA) and 0.821% for Tobin's Q ratio. Secondly, the authors also found that the impact of CSR on FP is positive and significant only if the environment, social and governance score surpasses the threshold of 56.780% when the dependent variable is ROA and 41.02% when Tobin's Q ratio measures performance.

Research limitations/implications – A significant part of the literature supports the linear relationship between CSR and FP from the unique direction (CSR → FP). This study comes to fill this gap by assessing the possible nonlinear relationship. In addition, this nonlinear relationship is tested under the two directions. Therefore, defining the threshold of FP that allows companies to engage in CSR, on the one hand, and the threshold of engagement in CSR that improves FP, on the other hand, could be an exciting topic.

Practical implications – To get the full benefit from CSR effects, firms should be with better financial performance to be socially responsible.

Originality/value – To the best of our knowledge, few studies have explored the nonlinear relationship between CSR and FP. In addition, this study raises the question of whether this relation is causal. The authors assess the two nonlinear relationships between CSR ? FP and FP ? CSR by determining the optimal thresholds.

Keywords Firm performance, Corporate social responsibility, European firms, Nonlinear relationship, PSTR model

Paper type Research paper

1. Introduction

It is undoubtedly that corporate social responsibility (CSR) plays a central role for stakeholders, the environment and overall society. It is recognized today as a leading standard business practice. The fundamental purpose of CSR is to maximize the value creation for the owners, meet the stakeholders' requirements, offer work flexibility, improve

the work conditions for their employees and ensure value creation for all of society (Matsumura and Ogawa, 2016; Fanti and Buccella, 2016; Arturo *et al.*, 2018).

In the age of the pandemic coronavirus 19 (COVID-19), companies that are socially responsible play a crucial role.

To protect their employees, most worldwide companies give more work flexibility to their employees to carry out their work from home. However, not all jobs are suited to such an arrangement. For this reason, some companies operating in vital sectors have continued working to ensure customer services (banks, postal offices, etc.), product distribution and market supply. Since companies are socially responsible toward their employees, even if there is no effective work, they have been committed to paying their employees' wages.

Moreover, some large and profitable companies in all sectors have supported their government with donations to combat COVID-19. This COVID-19 pandemic was considered a concrete example confirming that most firms are socially and economically responsible. In this respect, the questions that deserve to be addressed are the following: What about the financial aspect? How CSR and firm performance (FP) can interact among themselves?

Previous studies have focused heavily on the effect of CSR on FP from a unique perspective (Liu and Lu, 2019; Yoon and Chung, 2018; Rodriguez-Fernandez, 2016; Muñoz *et al.*, 2015; Madueño *et al.*, 2016). However, we also believe that to be in a better position to undertake CSR, firms should have better financial performance. In other words, a certain level of performance must be satisfied to engage in CSR practices. Therefore, investigating the FP threshold that allows companies to engage in CSR and defining the CSR threshold that improves FP could be an exciting topic.

This paper aims to investigate the nonlinear reciprocal relationship between CSR and FP. To achieve this goal, we used a dataset of 814 European firms over the period 2008–2017. CSR and financial data are collected from the DataStream of the Thomson Reuters ASSET4 database. This study performs the Panel Smooth Transition Regression (PSTR) model as an econometric approach.

This study fills the nonlinear gap in the CSR–FP relationship and contributes to the literature in several ways. First, it extends the work of Nollet *et al.* (2016) and Lin *et al.* (2020), which investigates the nonlinear relationship between CSR and FP. These two studies used an inverted V-shaped relationship. However, in the current study, we performed the PSTR model that defines an optimal CSR threshold that affects FP. In addition, it allows us to discuss the effect of CSR on FP below and above the defined threshold. The second originality of this paper is that it investigates this relationship within two directions: (1) the nonlinear relationship between CSR and FP and (2) the nonlinear relationship between FP and CSR. No prior studies have investigated these two reciprocal relationships. Besides the positive effect of CSR on FP, we think that firms should have a better financial performance to undertake CSR. In other words, a certain level of performance should be achieved to engage in CSR practices. Hence, searching for the threshold of FP that allows firms to engage in CSR and defining the threshold of CSR that improves FP could be an exciting topic.

The remainder of this paper is structured as follows: Section 2 presents a brief literature review. In Section 3, we describe the sample and the econometric approach. We discuss the empirical results in Section 4. Section 5 concludes and addresses some policy implications.

2. Literature review

While prior studies focused on the relationship between CSR and FP have addressed this question only from one direction, CSR→FP, in the current study, we aim to explore this relationship within the two directions. In this literature review section, we will try to theoretically justify how the level of performance is critical to engage in CSR practices firstly. Secondly, we review studies focused on the effect of CSR on FP using either linear or nonlinear approaches.

2.1 From firm performance to engagement in CSR: theoretical background
The theoretical discussion about the relationship between CSR and FP continues to animate academic debate. Studies testing the CSR–FP relationship give contradictory conclusions (Bruna and Ben Laouhel, 2022). Indeed, prior researchers have found mixed results suggesting a positive (Rodriguez-Fernandez, 2016; Muñoz *et al.*, 2015; Madueño *et al.*, 2016), negative (Peng and Yang, 2014), or even U-shaped or neutral relationship (Baird *et al.*, 2012; Peng and Yang, 2014). These inconsistencies can be explained through recognition of the potential for CSR to be both a predictor and a consequence of financial performance (Waddock and Graves, 1997; Saridakis *et al.*, 2023). The incoherent empirical results challenge the logic underlying the causal relationship between CSR and FP. Indeed, it is imperative to investigate if financial performance drives a firm's participation in CSR.

Higher financial performance would predict better social performance to the extent that high FP allows firms to divert their focus from short-term financial objectives to social objectives (García-Sanchez and Martínez-Ferrero, 2019; Mattingly and Olsen, 2018). Consequently, improvements in FP will lead to higher engagement in socially responsible activities (Melo, 2012).

Moreover, some authors put into evidence the role of slack resources on engagement in CSR activities. According to the slack resource theory (Mcguire *et al.*, 1988), firms might increase their engagement in CSR activities when the availability of financial resources increases (Waddock and Graves, 1997; Surroca *et al.*, 2010; Zhang *et al.*, 2021*et al.*).CSR is considered a cost-saving strategy that needs substantial resources (Farooq *et al.*, 2017). Indeed, CSR activities may be considered a firm expense that diverts valuable resources to activities that do not directly enhance shareholder value (Kotchen and Moon, 2012; Tang *et al.*, 2015).

However, empirical research studying how FP influences CSR engagement is still relatively rare. Preston and O'bannon (1997) investigate the relationship between indicators of CSR and financial performance with large American firms and show that better financial performance results in superior CSR activities and disclosures. Gautam *et al.* (2016) reveal that the Indian firm's financial performance has a cause-and-effect relationship with the CSR disclosure and vice versa. Tang *et al.* (2015), (2018) find that FP positively impacts CSR. More recently, based on a large sample of US firms, Saridakis *et al.* (2023) conclude that historical and social performance comparisons have differential effects on CSR engagement.

From the development above, the following hypothesis can be raised:

H1. Firms should attain a certain performance threshold to engage in CSR practices.

2.2 From CSR to firms' performance: related studies
Literature on the CSR–FP relationship provides mixed results. An important part of literature supports CSR's positive effect on FP (Margolis *et al.*, 2007; Orlitzky *et al.*, 2003; Barnett and Salomon, 2012; Rodriguez-Fernandez, 2016; Muñoz *et al.*, 2015; Madueño *et al.*, 2016). Less abundant studies found a negative association between CSR and FP (Peng and Yang, 2014). In contrast, some other studies found no significant or U-shaped relationship (Soana, 2011; Sun *et al.*, 2010; McWilliams and Siegel, 2000; Baird *et al.*, 2012; Peng and Yang, 2014).

For the American context, Liu and Lu (2019) tested the impact of CSR on the performance and risk of US firms. The dataset used in this study is based on 15,328 firm-year observations observed during the period 2004–2012. Results show that firm reputation positively influences both CSR and FP, while it is negatively related to firm risk. The authors also conclude that firm reputation could play a mediating role in the CSR–performance–risk relationship. In the same context, Yoon and Chung (2018) concluded that external CSR increases a firm's market value but is negatively related to operational profitability.

In addition, they found that internal CSR improves firms' operational profitability but does not affect their market value.

An important part of studies is carried out in the European context (Rodriguez-Fernandez, 2016; Muñoz *et al.*, 2015; Madueño *et al.*, 2016; Madorran and Garcia, 2014; Battaglia *et al.*, 2014; Fischer and Sawczyn, 2013). Most of these studies empirically supported the positive impact of CSR on FP. Rodriguez-Fernandez (2016) investigated the causal relationship between CSR and FP. Findings support strong evidence of the bidirectional relationship between CSR and Spanish FP. In a recent study, Lu *et al.* (2020) investigated the relationship between CSR and firm competitiveness. They used a sample of 33 Lithuanian companies. The authors found that individual scores, such as environmental, social and economic affect financial capacity, efficiency, innovation and company's reputation differently.

When reviewing the literature, we have noticed that studies on the CSR–FP relationship are intensely abundant in the Asian context. Like the American and the European contexts, the empirical findings of these studies supported the positive association between CSR and FP (Han *et al.*, 2016; Laskar and Maji, 2016; Nadeem *et al.*, 2019; Soewarno, 2018; Dyck *et al.*, 2018). In this vein, Nadeem *et al.* (2019) examined the channel through which CSR affects FP. They used a large sample of 1,021 Asia Pacific firms from 2006 to 2016. Findings show that CSR is positively and significantly associated with FP. Similarly, Rasheed *et al.* (2018) used a sample of 70 nonfinancial firms listed in the Karachi Stock Exchange over the period 2008–2013 to examine the impact of CSR on firms' performance in Pakistan. The empirical results provide strong evidence of the positive impact of CSR on FP.

Moreover, it was found that firms investing in CSR have better financial performance. More recently, using a sample of 577 publicly listed companies [1] during the period 2008–2017, Garas and El-Temtamy (2020) explored the dynamic and causal relationship between CSR and FP. The authors found that the extent of environmental disclosure improves the FP.

To examine the effect of CSR on small and medium enterprises' innovation capability and financial performance, Bahta *et al.* (2020) used a sample of 402 Eritrean firms. They performed the partial least squares (PLS) structural equation modeling. Empirical findings indicate that CSR has a positive and significant effect on the innovation capability of SEMs and the level of financial performance.

Besides studies based on linear approaches, other works focus on the nonlinear relationship between CSR and FP (Lin *et al.*, 2020; Nollet *et al.*, 2016). Some other studies supported the existence of a U-shaped or an inverted U-shaped relationship between CSR and FP (Brammer *et al.*, 2006; Barnett and Salomon, 2006, 2012; Lankoski, 2008; Miras-Rodríguez *et al.*, 2014).

Recently, Lin *et al.* (2020) tested the effect of market differentiation on the nonlinear relationship between CSR and FP. They used a sample of 132 firms over the period 2011–2017, and performed an inverted V-shaped relationship. Findings indicate that surpassing a certain threshold of CSR engagement can boost FP through market differentiation. Nollet *et al.* (2016) analyzed the linear and nonlinear relationship between CSR and FP for a sample of S&P500 firms in the period 2007–2011. Empirical results of linear regression support a negative association between CSR and FP.

On the contrary, the nonlinear regressions provide a U-shaped relationship between CSR and the accounting-based measures of FP. This leads to confirmation that in the long run, CSR exerts a positive effect on FP.

Barnett and Salomon (2006) tested the curvilinear relationship between CSR and financial performance. To achieve this goal, they used a panel of 61 socially responsible investment funds from 1972 to 2000. The main empirical findings of this study indicate that there is a curvilinear relationship. For example, at first, financial return declines but rebound as the number of CSR screens reaches the maximum.

In another paper, Barnett and Salomon (2012) tested the U-shaped relationship between CSR and FP. They used an initial unbalanced panel of 3,100 firms from 1991 to 2006. The empirical results show that the level of FP differs across the reached score of CSR. For example, firms with low CSP registered higher CFP than firms with moderate CSP; however, firms with high CSP recorded the highest CFP.

Using a sample of 89 firms in the electrical industry from 26 different countries for the period studied, 2008–2011, Miras-Rodríguez et al. (2014) investigated whether CSR engagement affects the firm level of performance. The authors conclude that a U-shaped curve explains the relationship between CSR and FP. More precisely, larger performance is registered for companies with the lowest and highest CSR scores. However, firms with less extreme scores are less profitable. In the same line of idea, Brammer et al. (2006) tested the relationship between CSR and stock returns in the United Kingdom. The authors found a U-shaped relationship. Firms with higher social performance scores tend to record lower returns. Firms with lower CSR scores or zero tend to achieve higher returns.

Lankoski (2008) states that the overall relationship between CSR practices and managerial revenues is concave. He reports that if the marginal costs of CR outcomes increase, the marginal revenues will decrease. Hence, an inverted U-shaped relationship exists between CSR activities and economic performance. Based on the development above, we can raise the following hypothesis:

H2. There is a threshold effect in the CSR–FP relationship.

The observation of existing literature on the CSR–FP relationship reveals two observations. First, the majority of these studies are based on a linear framework. Previous studies generally used either fixed or random effects (Laskar and Maji, 2016; Javeed and Lefen, 2019), dynamic panel data analysis (Javeed and Lefen, 2019) and Smart PLS (Madueño et al., 2016). Few empirical research works investigate the nonlinear framework. Second, most studies addressed the CSR–FP relationship from one direction, CSR→FP; however, nothing was said about the inverse relationship FP→CSR. The current study checks whether the CSR–FP relationship could be nonlinear. Hence, we used a nonlinear model based on the PSTR approach.

3. Data and method
3.1 The sample
To assess the nonlinear relationship between CSR and FP within the two directions CSR→FP and FP→CSR, we used a large sample of European firms belonging to the ASSETS 4 index over the period 2008–2017. The initial sample covers 1,116 firms, however, due to the problem of availability and continuity of CSR information, several firms have been excluded. We excluded firms for which the ESG scores information was missing for over two years. Hence, the sample was then reduced to only 814 firms located in 20 European countries [2]. Data related to CSR that was measured by the ESG score are collected from the DataStream of Thomson Reuters ASSET4 database.

3.2 The econometric approach
The PSTR model proposed by González et al. (2005) is a nonlinear model that aims to define an optimal threshold between the dependent variable $(VD_{i,t})$ and the main independent variable called the transition variable $(q_{i,t})$. It also allows discussing the transition variable's effect on the dependent variable below and above the defined threshold.

While most studies on CSR–FP performance are focused on the linear relationship based either on static or dynamic panel data, the current study differs from the previous ones and performs the PSTR approach as a nonlinear model. We think that there is a threshold from

which CSR can affect FP either positively or negatively. Initially proposed by González *et al.* (2005), the PSTR model was considered an extension of the panel threshold regression (PTR) model of Hansen (1999). Theoretically, the PSTR is given by Equation (1).

$$y_{i,t} = \mu_i + \beta'_0 x_{i,t} + \beta'_1 x_{i,t} g(q_{i,t}, \gamma, c) + \varepsilon_{i,t}, \tag{1}$$

where $i = 1, \ldots, N$ and $t = 1, \ldots, T$. N and T denote the cross-section and time dimensions of the panel, respectively. In the PSTR model of González *et al.* (2005), $y_{i,t}$ is the dependent variable and u_i indicates the vector of the individual fixed effects. $g(q_{i,t}, \gamma, c)$ is the transition function that depends on a transition variable denoted as (q_{it}). (C) and (γ) represent the parameter of the threshold and the smooth transition parameter, respectively. $x_{i,t} = (x^1_{i,t}, \ldots \ldots, x^k_{i,t})$ is a vector of k explanatory variables and $\varepsilon_{i,t}$ is a random disturbance. β_0 and β_1 indicate the parameter vector of the linear and the nonlinear models, respectively.

To define the transition function, following Granger and Teräsvirta (1993), Teräsvirta (1994), Jansen and Teräsvirta (1996) and González *et al.* (2005) propose the logistic form of m orders shown in Equation (2).

$$g(q_{i,t}, \gamma, c) = \left[1 + \exp\left(-\gamma \prod_{j=1}^{m} (q_{i,t} - C_j) \right) \right]^{-1}, \tag{2}$$

where $\gamma > 0$, $c_1 < \ldots < c_m$ and $c = (c_1 \ldots \ldots c_m)$ is a vector of the level parameter. γ represents the supposed positive smooth parameter. To assess the nonlinear relationship between CSR and FP within the two directions, we use the following econometric models, and the transition function is given in Equations (3) and (4).

$$
\begin{aligned}
FP_{i,t} = {}& \mu_i + \alpha FP_{i,t-1} + \beta^1_0 ESGS_{i,t} + \beta^2_0 SIZE_{i,t} + \beta^3_0 SALGR + \beta^4_0 TANG_{i,t} + \beta^5_0 LEVR_{i,t} \\
& + \beta^6_0 DIVP_{i,t} \left[\beta^1_1 ESGS_{i,t} + \beta^2_1 SIZE_{i,t} + \beta^3_1 SALGR + \beta^4_1 TANG_{i,t} + \beta^5_1 LEVR_{i,t} \right. \\
& \left. + \beta^6_1 DIVP_{i,t} \right] g(ESGS_{i,t}, \gamma, c)
\end{aligned}
\tag{3}
$$

where FP is the dependent variable measured by return on assets (ROA) and Tobin's Q. Environment, social and governance score (ESGS) is the transition variable. To study the inverse relationship that assesses the FP→CSR association, we used the following model given in Equation (4).

$$
\begin{aligned}
ESGS_{i,t} = {}& \mu_i + \alpha ESGS_{i,t-1} + \beta^1_0 FP_{i,t} + \beta^2_0 SIZE_{i,t} + \beta^3_0 SALGR + \beta^4_0 TANG_{i,t} + \beta^5_0 LEVR_{i,t} \\
& + \beta^6_0 DIVP_{i,t} \left[\beta^1_1 FP_{i,t} + \beta^2_1 SIZE_{i,t} + \beta^3_1 SALGR + \beta^4_1 TANG_{i,t} + \beta^5_1 LEVR_{i,t} \right. \\
& \left. + \beta^6_1 DIVP_{i,t} \right] g(FP_{i,t}, \gamma, c) + \varepsilon_{i,t}
\end{aligned}
\tag{4}
$$

where ESGS is the dependent variable that represents the CSR score. FP is the transition variable measured by both ROA and Tobin's Q ratio. All variables' definitions and measurements are given in Table 1.

4. Empirical results
This section is devoted to first analyzing descriptive statistics and checking for multicollinearity problems. Secondly, we conducted some *pre*tests before testing the PSTR model. Finally, we discuss the empirical findings.

Acronyms	Variables	Definition	
TobinQ (%)	Tobin's Q ratio	Total market value of firm/total asset value of firm	
ROA (%)	Firm performance	Net income/total assets	
ESGS	Environmental, social and governance score	ESG score is an overall company score based on the self-reported information in the environmental, social and corporate governance pillars	
SIZE	Firm size	The natural logarithm of total assets	
SALGR (%)	Sales growth	The growth rate of total sales	
TANG (%)	Tangible	Fixed assets in % of total assets	
LEVR (%)	Leverage	Total debts/total assets	
DIVP (%)	Dividends payout ratio	Dividends/net income	
Source(s): Table inserted by authors			Table 1. Variables definition

4.1 Descriptive statistics and correlation matrix

Descriptive statistics are displayed in Table 2. This table gives more information about data on European firms observed from 2008 to 2017.

Statistics indicate that the average ROA for European firms is 5.536% with a maximum value of 100.826% and −122.057% as a minimum value. Furthermore, the mean value of Tobin's Q is 0.927%, with a maximum value of 14.710 and 0.009% as a minimum value. These statistics indicate that among the whole sample, there are firms that recorded a higher level of performance, but this does not prevent the existence of other firms that recorded lower and negative performance levels.

Regarding the CSR measures, the mean value of the ESG score is 58.990%. The European firms recorded 95.97% as a maximum score and 6.66% as a minimum score. This means that, on average, European firms are socially responsible. Nevertheless, from the same statistics, we notice that some firms recorded lower than 7% scores.

As firm specifics, we introduced firm size, sales growth, tangible and leverage ratio and dividend payout ratio in the econometric model. Statistics indicate that the average size is 3.94, with a maximum of 7.12 and 0.226 as a minimum value. The European firms also recorded a lower rate of growth sales, with only 0.072% as a mean value. However, some firms registered higher rate of growth sales of 98.13% and others with negative rate of sales growth with a value of −5.68%. The average value of fixed assets in % of total assets is equal to 26.31%. The ratio of total debt in % of total assets registered a mean value of 0.26% and a maximum value of 2.53%.

Variables	Mean	Std. dev	Min	Max	
TobinQ	0.927	1.14	0.009	14.710	
ROA	5.536	8.662	−122.057	100.826	
ESGS	58.990	16.385	6.66	95.97	
SIZE	3.947	0.885	0.226	7.120	
SALGR	0.072	1.195	−5.685	98.135	
TANG	26.317	25.333	0.000	170.113	
LEVR	0.266	0.185	0.000	2.538	
DIVP	36.278	27.004	0.000	100	
Source(s): Table inserted by authors					Table 2. Descriptive statistics

After analyzing descriptive statistics and checking for the multicollinearity problem, Table 3 presents a correlation matrix between independent variables used in this study.

From Table 3, we notice that there is no high correlation between variables. All correlations between independent variables are lower than 30%. This leads to confirming that there is no significant problem of multicollinearity.

4.2 Results of the pretest of the PSTR model

Before testing the PSTR model, some initial conditions should be checked before. The relationship between the dependent variable and the transition variable should be nonlinear. It is for this reason that we first conduct a test of linearity. Once the nonlinearity is confirmed, we should test the number of regimes. Finally, the threshold value makes it possible to define the optimal level of ESG that affects the level of FP. In addition, it becomes possible to analyze results below and above a certain threshold.

Three tests are applied to check for nonlinearity. These tests are the Lagrange Multiplier (Wald test), the Lagrange Multiplier (F-test) and the Likelihood-ratio test (LRT). The null hypothesis is H0: $\beta_1 = 0$ and the alternative is H1: $\beta_1 \neq 0$. Table 4 summarizes the statistics of the three tests for linearity.

Statistics in Table 4 show that the null hypothesis is rejected at the 1% level for the three tests. These statistics confirm that the relationship between CSR and FP in European countries is nonlinear either for the impact of CSR on FP or for the inverse relationship from FP to CSR.

When the nonlinearity hypothesis is confirmed, we can test for the number of regimes. This test is used to check if the PSTR model has one function of transition $(m = 1)$ (null hypothesis) or if it has at least two functions of transition $(m = 2)$ (alternative hypothesis). Statistics of the LRT and LMF tests are used to make this decision. Table 5 presents the result of the number of regimes.

	Size	Salgr	Tang	Levr	Divp
SIZE	1.0000				
SALGR	−0.0173	1.0000			
TANG	−0.1461*	0.0016	1.0000		
LEVR	−0.0198	−0.0083	0.2570*	1.0000	
DIVP	0.0590*	−0.0231	−0.0272*	−0.0638*	1.0000

Table 3.
Correlation matrix

Source(s): Table inserted by authors

Transition variables	CSR (ESGS) → Performance				Performance → CSR (ESGS)			
	ROA		Tobin's Q ratio		ROA		Tobin's Q ratio	
Tests	Statistics	*p*-value	Statistics	*p*-value	Statistics	*p*-value	Statistics	*p*-value
Lagrange multiplier wald test	40.145	0.000***	35.128	0.000***	25.363	0.000***	48.296	0.000***
Lagrange multiplier *F*-test	5.837	0.000***	5.109	0.001***	3.679	0.001***	7.039	0.001***
Likelihood-ratio test	40.277	0.000***	3.892	0.000***	25.416	0.000***	48.485	0.000***

Table 4.
Linearity tests

Note(s): ***indicates level of significance at 1%
Source(s): Table inserted by authors

Transition variables

| Hypotheses | Tests | CSR (ESGS) → Performance | | | | Performance → CSR (ESGS) | | | |
| | | ROA | | Tobin's Q ratio | | ROA | | Tobin's Q ratio | |
		Statistics	*p*-value	Statistics	*p*-value	Statistics	*p*-value	Statistics	*p*-value
(1)H₀: r = 0;H₁: r = 0	LRT	103.764	0.000***	151.299	0.000***	303.701	0.000***	492.336	0.000***
	F	9.942	0.000***	14.596	0.000***	27.413	0.000***	50.335	0.000***
(2)H₀: r = 1;H₁: r = 2	LRT	134.446	0.000***	205.614	0.000***	395.421	0.000***	523.692	0.000***
	F	7.220	0.000***	11.154	0.000***	24.587	0.000***	30.002	0.000***

Note(s): ***indicates level of significance at 1%
Source(s): Table inserted by authors

Table 5.
Test for the number of regimes

Table 5 shows that both the hypothesis without a threshold *(r = 0)* and the hypothesis with at least two thresholds *(r = 2)* are rejected at the 1% significance level for the two tests. Hence, we reject the null hypothesis and we admit that there exists at least two functions of transition and the model has one threshold for the two relations: CSR→ FP and FP→CSR.

4.3 Threshold values

The third step consists of defining the threshold values. One of the fundamental objectives of the PSTR model is to study the possible nonlinear relationship based on a certain threshold. Table 6 summarizes the results of the threshold values of CSR and FP.

Results displayed in Table 6 indicate that the threshold of ESGS is 56.780% when ROA is the dependent variable and 41.02% when Tobin's Q ratio is the dependent variable. In addition, the values of the smooth positive parameter γ are equal to 0.200 and 1.400. These weak values of γ confirm the good quality of the PSTR model that requires weak value of γ to well consider it as smooth model. Within a high value of parameter γ, the model becomes PTR. We also notice that the mean value of the ESG score of 58.990% is greater than the two thresholds of 56.780 and 41.02%. Hence, we can consider that European firms have attained the necessary thresholds on average.

However, since the minimum value of ESGS is 6.66%, some other firms are invited to improve this score to surpass these thresholds and get full benefits from its effects on FP.

With regard to the threshold of performance that encourages firms to engage in CSR, we found that European firms should surpass the threshold of 1.23% for ROA and 0.821% for Tobin's Q ratio.

4.4 Results of the PSTR model

In this subsection, we present the results of the CSR–FP relationship taking into the two directions. The first one is from FP to CSR (Table 7) and the second is from CSR to FP (Table 8). We think that to get full benefit from CSR effects, firms should have better financial performance to undertake CSR.

4.4.1 FP→CSR: a threshold effect. Results in Table 7 indicate that below the thresholds of 1.231% for ROA and 0.821% for Tobin's Q ratio, FP is found to be without any significant effect on CSR. However, surpassing these thresholds, FP exerts a positive and significant effect on ESGS. To meet the requirements and standards of CSR, a firm should support some costs and expenses due to implementing some different proceedings and modes of operation. In addition, training employees, improving work conditions, thinking, and acting for the safety of the environment and the whole society would be costly for companies. In this case, firms that recorded lower or negative levels of performance cannot better undertake the requirements of CSR. Hence, we think an initial stage of performance is required before a firm can engage in CSR practices. Better financial performance would predict better social performance (García-Sanchez and Martínez-Ferrero, 2019; Mattingly and Olsen, 2018). Some authors argue that any improvement in FP will lead to higher engagement in socially

| | CSR (ESGS) → Performance | | Performance → CSR (ESGS) | |
	Performance is ROA	Performance is Tobin's Q	Performance is ROA	Performance is Tobin's Q
γ	0.200	0.200	0.200	1.400
C	*56.780%*	*41.02%*	*1.231%*	*0.821%*
AIC	3.096	0.069	3.684	3.667
BIC	3.117	0.084	3.699	3.682

Note(s): The italic values represent the threshold level
Source(s): Table inserted by authors

Table 6.
Results of threshold values

Variable	Performance is ROA		Performance is Tobin's Q ratio	
	Coeff	T-stat	Coeff	T-stat
First regime	*ROA < 1,231%*		*TobinQ < 0.821%*	
FP	0.858	1.376	1.809	1.425
SIZE	1.281	4.943***	1.330	3.342***
SALGR	1.817	2.564***	0.322	2.048**
TANG	2.426	0.099	0.005	0.170
LEVR	−2.080	−2.321**	1.899	1.675*
DIVP	1.320	3.063***	0.039	2.523**
Second regime	*ROA > 1.231%*		*TobinQ > 0.821%*	
FP	0.574	4.323***	1.662	2.857***
SIZE	2.991	5.399***	2.789	5.160***
SALGR	1.932	2.550**	1.647	2.502***
TANG	2.451	0.096	0.036	0.814
LEVR	−2.917	−2.381**	−2.386	−1.897*
DIVP	0.420	3.073***	0.090	3.791***
AIC	3.684		3.667	
BIC	3.699		3.682	
C	1.231%		0.821%	
γ	0.200		1.400	
F (11, 6,139)	65.521 (0.000)		79.185 (0.000)	
Obs	8.129		8,129	

Note(s): ***, ** and * indicate level of significance at 1%, 5% and 10%. ESGS is the dependent variable. The italic values represent the first and the second regimes
Source(s): Table inserted by authors

Table 7.
Results of the threshold effect of FP on CSR

Variable	Performance is ROA		Performance is Tobin's Q ratio	
	Coeff	T-stat	Coeff	T-stat
First regime	*ESGS < 56.78%*		*ESGS < 41.02%*	
ESGS	−0.022	−1.523	2.493	0.683
SIZE	−1.200	−2.174**	−1.700	−0.082
SALGR	2.688	7.834***	1.372	3.074***
LEVR	−1.951	−2.070***	−0.284	−3.068***
TANG	0.005	0.036	−2.671	−1.331
DIVP	0.009	1.962**	2.050	2.167**
Second regime	*ESGS > 56.78%*		*ESGS > 41.02%*	
ESGS	0.040	2.413**	0.031	3.683***
SIZE	0.082	0.352	2.829	4.082***
SALGR	0.513	1.077	2.873	0.074
LEVR	−0.201	−5.229***	−0.596	−5.032***
TANG	−0.026	−3.028***	−1.231	−1.831*
DIVP	0.020	3.418***	0.100	0.467
AIC	3.096		0.069	
BIC	3.117		0.084	
C	*56.78%*		*41.02%*	
γ	0.200		0.200	
F (11, 6,139)	53.447 (0.000)		9.219 (0.000)	
Obs	8.129		8,129	

Note(s): ***, *** and * indicate level of significance at 1, 5 and 10%. ROA and Tobin's Q ratio are the dependent variables
Source(s): Table inserted by authors

Table 8.
Threshold effect of CSR on FP

responsible activities. This result is in line with the findings of Preston and O'bannon (1997), Melo (2012), Tang *et al.* (2018) and Saridakis *et al.* (2023).

We also found that large firms are likely to be more engaged in CSR. We found that firm size is positively and significantly correlated with ESGS. This positive effect is confirmed either below or above the threshold of performance. Firms with big sizes are generally more experienced and look to improve their performance and reputation. They are more likely to meet the standards and practices of CSR to maximize the value creation for the owners, offer more work flexibility, protect the environment and ensure the value creation for all of society. Considering the more extensive resource availability at relatively low costs, larger firms can more easily afford CSR disclosures (Brammer and Millington, 2006; Udayasankar, 2007). Additionally, large firms are more likely to communicate their commitments to CSR practices (Baumann-Pauly *et al.*, 2013). This result is similar to the findings of Ting (2021), who found that firm size positively affects firms' CSR disclosure.

Sales growth and dividends payout ratio are positively and significantly associated with the dependent variable within the two regimes. Firms that experience high growth sales rates and distribute high dividend payout ratios are generally financially stable and profitable. Firms with better performance can easily engage and undertake CSR standards. According to the slack resource theory, when the availability of financial resources increases, firms might increase their engagement in CSR activities (Mcguire *et al.*, 1988).

Contrary to the effect of firm size, sales growth and dividends payout ratio, we found that engagement in CSR standards is negatively sensitive to an increase in the leverage ratio. More leveraged firms should pay a high level of financial expenses. A high leverage ratio limits the ability of firms to implement some new differed proceedings and modes of operation. Furthermore, undertaking CSR through ensuring training of employees, improving work conditions and searching for the safety of the environment and the whole society will be difficult.

4.4.2 CSR→FP: a threshold effect. Findings of the PSTR model are displayed in Table 8. From these results, we notice that surpassing the threshold of 56.780% for ROA and 41.02% for Tobin's Q ratio, ESGS exerts a positive and significant effect on FP. In addition, results show that only sales growth and dividends payout ratio exert a positive and significant effect on the level of FP for both ROA and Tobin's Q ratio. Conversely, firm size and leverage ratio are negatively associated with the dependent variable measured by ROA. However, we found that tangible does not exert any significant impact.

From Table 8, we notice that the CSR effect differs from the first regime to the second one. Below the threshold of 56.780% for ROA and 41.02% for Tobin's Q ratio, results indicate that the effect of ESGS is insignificant. However, surpassing the previously mentioned thresholds, the effect becomes positive and significant. An increase by 1% in the ESGS leads to an increase in the level of FP by 4% for ROA and almost 3% for Tobin's Q ratio. In order to get full benefits from the effect of CSR on FP, European firms should improve their CSR scores and surpass the threshold of 56.780% for ROA and 41.02% for Tobin's Q ratio. Companies that respect CSR practices provide good working conditions and more flexibility in workplace. This creates more incentives for employees that become more productive in order to improve financial and social performance. The reputation of companies that consistently prove their commitment to CSR initiatives will significantly increase. In this case, it results in an increase in sales growth that positively affects FP. According to the 2016 Neilson survey, more than 50% of customers are willing to purchase more products from companies that are socially responsible. This finding is in line with the work of Rodriguez-Fernandez (2016), Muñoz *et al.* (2015) and Madueño *et al.* (2016).

In addition to the positive effect of CSR, results indicate that the dividends payout ratio is positively and significantly correlated with the dependent variable for both ROA and Tobin's Q ratio. Contrary to studies that report that high dividends payout ratio leads to more

dividends and fewer funds for expansion and growth, we found that the dividends payout ratio is positively and significantly associated with FP. In general, dividend policy is an instrument of wealth distribution that can attract actual and potential investors. Firms' dividend payout offers information about current and future performance. More precisely, the cash dividends announcement leads to more information disclosure regarding firm's future performance. Hence, information asymmetry between shareholders and manager will be reduced. Having enough and necessary information makes the assessment of the firm's financial performance easy and improves investment decisions. This result is convergent with the works of Zhou and Ruland (2006), Murekefu and Ouma (2012) and Pandey (2010).

Contrary to the effect of CSR and dividend payout ratio, findings indicate that below the optimal threshold, firm size negatively and significantly affects FP only for ROA. The task of control and governance becomes more complicated with larger firms. The ineffectiveness of governance and control leads to more risk-taking and speculative behaviors that adversely affect FP. This result is divergent from Brammer and Millington (2006), Udayasankar (2007), Baumann-Pauly et al. (2013) and Ting (2021).

In addition, the level of bureaucracy increases when the firm becomes larger. This situation results in a stiff resistance to change that generally decreases the FP. Larger firms require a strong level of coordination that makes managerial and control tasks more difficult and inefficient and decreases the level of performance. This result is in line with the works of Amato and Burson (2007) and Maja and Josipa (2012).

Regarding the effect of leverage ratio, we found that European FP is more sensitive to an increase in the debts-to-assets ratio either below or above the optimal threshold. This negative effect is confirmed for both ROA and Tobin's Q ratio. High level of leverage ratio increases financial expenses that decrease FP. In periods of crisis and financial instability, strongly debt-financed firms do not find creditors, bankers and suppliers. This limits the funding sources that affect firm investment and FP. This finding is similar to the results of Rajan and Zingales (1995), Majumdar and Chhibber (1999), Ghosh (2008) and Pandey (2002).

5. Conclusion and policy recommendations

The main purpose of this study was to investigate the nonlinear relationship between CSR and FP in the European context. More precisely, we assess the threshold of FP that makes it possible for firms to engage in CSR standards first. Secondly, we define the threshold of CSR that affects the level of FP. We used a sample of 814 located in 20 European countries and observed from 2008 to 2017. As a nonlinear approach, we performed the PSTR model of González et al. (2005).

The results of this paper support three main conclusions. First, it was shown that firms should register a certain level of performance to undertake CSR. European firms should surpass the threshold of 1.231% for ROA and 0.821% for Tobin's Q ratio to engage in CSR practices. Second, we found an association between CSR and FP is nonlinear, and we have defined a threshold of ESGS of about 56.780% when ROA is the dependent variable and 41.02% for Tobin's Q ratio. Below these thresholds, the effect of CSR is insignificant. However, surpassing this optimal threshold, the effect becomes positive and significant. In other words, above the threshold of 56.780% for ROA and 0.821% for Tobin's Q ratio, the ESGS significantly increases the level of FP in the European context. Third, firm specifics, sales growth and dividends payout ratio are positively and significantly associated with the dependent variable (ROA). However, firm size and leverage ratio decrease the level of FP substantially.

This paper's findings could be considered important and address some policy recommendations for policymakers or European firms. First, to get the full benefit from CSR effects, firms should have better financial performance to undertake CSR. Hence, a

certain level of performance is required before engaging in CSR standards. Second, as CSR significantly increases the level of FP within a certain threshold, it was recommended that European firms improve their CSR scores and respect the CSR standards and practices.

More precisely, European firms are invited to surpass the defined threshold of CSR to get full benefits from the effect of CSR on FP. Additionally, strong work is needed to improve the ESG score to achieve the optimal threshold from which CSR can positively affect the level of FP. Third, European firms should grant more importance to the sales activity and the dividends payout. These two variables are considered the main drivers of FP in the European context. The fourth policy implication appeals to streamlining the leverage ratio. A high ratio of debt to total assets is considered a harmful factor that decreases the level of performance.

While the results of this paper are interesting and could bring some important policy implications for policymakers, this study has some limitations. First, this study is based on developed countries (European countries), and there is no comparison between developing countries. Due to several economic, social, financial and doing business differences, companies in these countries record different levels of performance; hence they are less likely to engage in CSR practices. So, one of the limitations is that we cannot generalize this paper's results concerning the defined thresholds of performance and CSR. Second, since we found that sales growth and dividend payout significantly increase FP and incentive engagement in CSR practices, an interaction between these two variables could affect the defined threshold either of FP or CSR.

As future research, comparing developed and developing countries, including some interactional variables and using large sample and updated period of study, could improve this paper's findings.

Notes

1. Bahrain 22, Kuwait 159, Oman 126, Qatar 43, Saudi Arabia 102 and UAE 125.

2. For more details on the list of countries, the number of firms and the % in the total sample, see Appendix.

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Appendix

Countries	Codes	Number of firms	%
Austria	Aut	15	1.84
Belgium	BEL	24	2.95
Switzerland	CHE	58	7.13
Czech Republic	CZE	4	0.49
Germany	DEU	75	9.21
Denmark	DNK	24	2.95
Spain	ESP	41	5.04
Finland	FIN	25	3.07
France	FRA	87	10.69
United Kingdom	GBR	242	29.73
Greece	GRC	17	2.09
Hungary	HUN	4	0.49
Ireland	IRL	12	1.47
Italy	ITA	42	5.16
Netherlands	NLD	26	3.19
Norway	NOR	23	2.83
Poland	POL	17	2.09
Portugal	PRT	9	1.11
Sweden	SWE	46	5.65
Turkey	TUR	23	2.83
	20 countries	814 firms	100%

Table A1.
Description of the sample: number of firms by countries

Source(s): Appendix inserted by authors

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