Sustainable development: The stock market's view of environmental policy
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Abstract
This study applies panel data regression models to investigate how the stock market values the environmental policy of the firm. The empirical analysis relies on a cross-country sample of public firms for the period between 2014 and 2017 and uses the ratings of environmental performance (EP) released by Eikon Thomson Reuters. For the first time in the related literature, the price-to-sales multiple is used to capture the assessment of the stock market towards EP. The study reveals that firms with the highest (lowest) scores of EP are quoted at significantly lower (higher) price-to-sales multiples than other firms, indicating a negative perception of the stock market towards EP. This finding is mostly driven by firms from the American region (United States and Canada). However, even in the Scandinavian region, considered as the most advanced area with regard to the concern towards environmental issues, stock market participants do not seem to have a positive view of EP. These results are robust to various checks and, particularly, to the use of the Tobin Q ratio as an alter- native indicator of the stock market perceptions. The inference of this analysis sug- gests that the negative assessment of the stock market towards EP may constitute a deterrent for achieving more environmentally committed firms, making it difficult to accomplish the United Nations' Sustainable Development agenda.
KEYWORDS
environmental performance, environmental policy, financial performance, price-to-sales ratio, sustainable development, Tobin's Q

INTRODUCTION

The last decades have witnessed an outburst of interest in the relationship between environmental performance (EP) and financial performance (FP). However, despite the numerous studies on this issue, Endrikat, Guenther, and Hoppe (2014) argued that the overall picture of this relationship still remains vague. Hence, whereas most studies tend to report a positive relationship (e.g., Clarkson, Li, Richardson, & Vasvari, 2011; Hart & Ahuja, 1996; King & Lenox, 2001; Konar & Cohen, 2001; Russo & Fouts, 1997; Wagner & Schaltegger, 2004), others have observed a negative relationship (e.g., Cordeiro & Sarkis, 1997; Hassel, Nilsson, & Nyquist, 2005; Morris, 1997), and a third group of papers have yielded insignificant results (e.g., Gilley, Worrell, Davidson, & El-Jelly, 2000; Graves & Waddock, 1999; Link & Naveh, 2006). According to Endrikat et al., four sets of reasons may explain these inconclusive results: (1) lack of sound theoretical foundation; (2) lack of a clear idea of the direction of causality; (3) the inconsistency of defining and measuring the constructs of interest; and (4) the misspecification of the proposed models. Following Hussain, Rigoni, and Cavezzali (2018), we would add to this list the different institutional settings investigated in each study.

The theoretical arguments supporting a negative relationship between EP and FP generally focus on the impact of environmental activities on the costs structure of the firm, which more than offsets any potential benefits of these activities (Friedman, 1970; Preston & O'Bannon, 1997; Waddock & Graves, 1997). Therefore, in Friedman's own words, corporate social responsibility (CSR) constitutes a misallocation and

misappropriation of valuable company resources (Friedman, 1970). This rather narrow view of the goal of the firm has been challenged from various fronts. For example, the stakeholder theory (Donaldson & Preston, 1995; Jones, 1995) argues that because stakeholders expect the firm to behave in an environmentally responsible manner, EP may be regarded as a way of satisfying their own demands. Therefore, firms with strong EP may enjoy competitive advantages in terms of reputation, employees' involvement, or stable relationships with customers and suppliers (Hart, 1995; Lankoski, 2008; Orlitzky, Schmidt, & Rynes, 2003).

The standard approach to investigate the relationship between EP and FP utilizes accounting indicators of FP, such as the return on assets (ROA), the return on equity (ROE), or the net income (e.g., Gallego-A lvarez, Segura, & Martínez-Ferrero, 2015; Jaggi & Freedman, 1992; Wagner, Van Phu, Azomahou, & Wehrmeyer, 2002). However, some other studies have examined the relationship between EP and stock market indicators of FP, usually the Tobin Q ratio (e.g., Konar & Cohen, 2001; Wang, Li, & Gao, 2014). Although, commonly, studies refer indistinctively to accounting or stock market indicators as FP, it is important to acknowledge that they are not measuring the same issue. The main difference between both types of indicators is that accounting measures of FP are, essentially, internal to the firm, in the sense that they depend only on the level of earnings (and also assets in the case of ROA, or equity in the case of ROE) reported by the firm. Conversely, stock market indicators are essentially external to the firm, as they incorporate the view of investors and other stock market participants. Another fundamental difference is that because stock market indicators are based on the market value of the firm, these indicators are more comprehensive and long-term based than accounting-based indicators, which only incorporate a 1-year perspective. Therefore, accounting-based indicators of FP necessarily have to be considered as more limited than market-based indicators in their ability of capturing the actual relationship between EP and FP (Al-Tuwaijri, Christensen, & Hughes, 2004).

At the beginning of the century, Konar and Cohen (2001) formulated the question of whether the market valued EP. They investigate the issue in the context of the US large corporation. The research question addressed in this study is similar to Konar and Cohen's, although extended to the international context. Hence, the empirical analysis is based on the largest firms from America, China, and Europe, for the research period between the years 2012 and 2017. The dependent variable that our model intends to explain is the price-to- sales multiple (PS) of the firm. To the best of our knowledge, no prior related study has utilized this variable. The choice of the PS is mainly justified by the differences in the accounting standards across international jurisdictions. Hence, the standard market-value measures of FP used in prior related studies (the Tobin Q and, in a lesser extent, the market-to-book multiple) are not completely comparable across countries, as they focus on the book value of the firm, which is largely determined by the accounting standards of the firm's home country. Conversely, the PS is practically unaffected by these accounting standards because it focuses on sales and, in that regard, is more suitable for cross-country studies. With regard to the measure of EP, it consists of the score provided by the Eikon database for the "Environment" pillar of the Environmental, Social, and Governance (ESG) score.

The motivation for this study mainly relies on the real-world relevance of the topic investigated. Hence, the United Nations member states adopted in 2015 the Sustainable Development Goals (SDGs), a "universal call to action to end poverty,

protect the planet and ensure that all people enjoy peace and prosperity by 2030." At least seven1 out of the 17 specific SDGs are directly related to the EP of corporations. Because the achievement of these goals necessarily requires more environmentally committed firms, it becomes critical to understand which factors enhance or deter the level of EP of corporations. Additionally, even though the relationship between FP and EP has been widely investigated so far, the lack of academic consensus on the topic still calls for further research. Finally, but also most importantly, given that the concern of the whole society towards environmental matters is a dynamic issue, whose importance has increased dramatically over the last years (see, e.g., the SDGs approved in 2015), the evidence provided by the empirical studies becomes rapidly dated, therefore calling for further research. In that regard, in a recent study, Hoang, Przychodzen, Przychodzen, and Segbotangni (2020) observed that the impact of environmental variables influencing FP increased after the global financial crisis.

Following the above discussion, we aim to contribute to the environmental management literature by providing updated evidence on the stock market perception of the firm's EP in the international con- text. More specifically, despite the abundance of studies on the EP– FP relationship, we intend to fulfill some gaps in the literature. First, as discussed previously in this section, unlike most prior studies that rely on accounting-based indicators of FP, our analysis uses market- based indicators. To the best of our knowledge, this is the first study that measures FP through the PS ratio. The utilization of this valuation multiple, which presents advantages in cross-country studies, allows us to complement the available evidence so far on the basis of the Tobin Q and the market-to-book multiple as the indicators of FP. Second, whereas most prior studies are single-country studies (usually investigating the US context), the international sample of our paper allows us to investigate potential differences in the relationship between EP and FP across the main national jurisdictions. This issue is central, because the fact that the value relevance of sustainability issues for investors varies across countries (Miralles-Quiros, Miralles-Quiros, & Arraiano, 2017) likely explains the importance of the firm's home country as a moderator for the EP–FP relationship (Albertini, 2013; Dixon-Fowler, Slater, Johnson, Ellstrand, & Romi, 2013). Therefore, because the results reported for some specific settings cannot be generalized, the adoption of a wider geographical focus provides a more accurate picture of the actual relationship between EP and FP than does examining a single country. Finally, the considerably larger size of the sample (more than 2,000 firms and nearly 7,000 observations) compared with that of prior related studies,2 and the panel data structure of the dataset3 are also distinctive features of this study, which should strengthen the soundness of the reported results.

In anticipation of the results, we observe a consistent and strong negative relationship between EP and FP. Thus, investors value less (more) those firms that show stronger (weaker) EP. Interestingly, these results are mainly driven by American and Chinese firms, because for the European subsample of firms, the relationship between EP and FP becomes insignificant. We also provide some evidence of a U-shaped relationship between EP and FP. Overall, these results seem robust enough to hold across several checks, and, particularly, to the use of the Tobin Q as the indicator of FP in substitution of the PS.

The paper continues as follows. The next section summarizes the review of the literature on the relationship between EP and FP, with a focus on market-based

indicators of FP, and it develops the hypotheses of the study. Then, Section 3 presents the design of the empirical study and describes the sample. Section 4 shows and discusses the results of the empirical analysis, whereas the last section of the paper elaborates on the main conclusions, implications, limitations, and suggestions for further research.

BACKGROUND AND HYPOTHESIS DEVELOPMENT

The extant literature has developed arguments supporting both positive and negative effects of EP on FP. Chronologically, the first authors to elaborate on this issue argued that there existed a trade- off between both forms of performance (Aupperle, Carroll, & Hatfield, 1985; Friedman, 1970; Levitt, 1958; Vance, 1975). This negative relationship occurred because the improvement of EP requires to undertake a set of investments whose financial returns would not completely offset the higher costs assumed by the firm. Additionally, these authors point out that firms that excel in EP will be in worst conditions to compete with their less environmentally engaged peers and would be eventually expelled from the market (Aupperle et al., 1985; Vance, 1975). The view of this stream of the literature is summarized by Friedman in the title of his article published in 1970: "The social responsibility of business is to increase its profits" (Friedman, 1970). The article criticizes that any investment made following the application of social responsibility criteria will lead to mis- allocation of resources and, consequently, will involve the appropriation of shareholders' resources by the managers of the firm.

There is a consensus in the management literature that the above view has become rather dated nowadays. Moreover, the August 2019 declaration of the Business Roundtable (the association of the chief executive officers [CEOs] of the largest American firms) has redefined the purposed of a corporation in the following terms: "to promote 'an economy that serves all Americans'" (Business Roundtable, 2019). Furthermore, the declaration states: "the essential role corporations can play in improving our society when CEOs are truly committed to meeting the needs of all stakeholders." Therefore, neither would the top executives of the largest corporations nowadays agree (at least in formal declarations) with the too reductionist view of the goal of the firm as exclusively focused on pursuing the interests of the share- holders. The current definition of the goal of the firm by the Business Roundtable is more in line with most management scholars that have elaborated on the potential benefits of EP in terms of FP. For example, according to Molina-Azorín, Claver-Cortés, López-Gamero, and Tarí (2009), the environmental management may impact FP by affecting the firm's costs and differentiation levels. Regarding the costs, Porter and Van der Linde (1995) pointed out that because pollution can be regarded as an economic waste, pollution prevention may in fact positively contribute to the firms' profitability by reducing its costs. In the same vein, Hart (1997) and Taylor (1992) noted that by investing in pollution prevention, firms can reduce control costs and inputs as well as energy consumption. Schmidheiny (1992) popularized the term "eco-efficiency" to refer to the production of goods while progressively reducing the ecological impact and use of resources. In this same line, Molina-Azorín et al. concluded that firms should view EP more in terms of resource productivity (by considering, e.g., the opportunity costs of pollution) than just focus on the costs of implementing environmental initiatives. With regard to the

differentiation advantages associated with EP, firms with stronger EP will be better able to differentiate their products from those of their competitors (Rivera, 2002), will likely enjoy advantages in terms of ecological reputation (Miles & Covin, 2000), and will benefit from higher prices and sales owing to enhanced market legitimacy and greater social approval (Molina-Azorín et al., 2009). More specifically, Fanasch (2019) observed that individual reputation and eco- certification have a positive and significant impact on corporate per- formance. Additionally, the proponents of the instrumental stake- holder theory (Davis, 1973; Donaldson & Preston, 1995; Jones, 1995; Orlitzky et al., 2003) argued that trusting and cooperative behaviors solve problems related to opportunistic behaviors. In this vein, the firm's environmental engagement may be perceived as an indicator of cooperative behavior, therefore justifying a positive impact of EP on FP.

Regarding the available evidence, Hussain et al. (2018) reviewed the empirical studies that have examined the relationship between EP and FP. The examination of these articles reveals the following facts. (1) More than half of the articles focus on the US setting, and a just a few studies have an international scope (2) Regarding the measurement of EP, some studies utilize general indicators, whereas others use more specific indicators (e.g., greenhouse gas emission or toxic release inventory disclosure). (3) Concerning FP, most studies measure FP through accounting-based indicators (mainly, ROA and ROE, but also net income and cash flows); other studies follow the event study's methodology to capture the impact of corporate environmental events on short-term stock returns (e.g., Jin, Cheng, & Zeng, 2020; Keele & DeHart, 2011; Yadav, Han, & Rho, 2016); and a relatively small number of articles use market-based indicators of FP such as the Tobin Q (e.g., Konar & Cohen, 2001; Li, Liao, & Albitar, 2020; Minutolo, Kristjanpoller, & Stakeley, 2019; Wang et al., 2014) or the market-to-book multiple (Al-Najjar & Anfimiadou, 2012). (4) The results of these studies are inconclusive. Hussain et al. explained the lack of consensus on the grounds of the differences in the form of measuring EP as well as in the country of investigation.

Besides, the results of several meta-analyses indicate that (1) poor EP is generally associated with lower FP in the long run (Ambec & Lanoie, 2008; Hang, Geyer-Klingeberg, & Rathgeber, 2019; Molina- Azorín et al., 2009); (2) even though there exists a positive relation- ship between EP and FP, the relationship is influenced by factors such as the measures of EP and FP and the country/region investigated (Albertini, 2013; Horváthová, 2010); (3) EP seems to have stronger influence on market measures of FP than on accounting measures (Dixon-Fowler et al., 2013); and (4) there is a positive and partially bidirectional relationship between EP and FP (Endrikat et al., 2014). Next, we summarize the results of prior studies that have conducted similar analyses to ours. Given the aim of this study, next, we focus the attention on those papers that have measured FP through market-value indicators.

Konar and Cohen (2001) observed a positive and significant relationship between the reduction in emission of toxic chemicals and the Tobin Q ratio in the US context for the year 1989. More recently, Al- Najjar and Anfimiadou (2012) examined the link between EP and firm value in the United Kingdom for the years between 1999 and 2008, and they observed that eco-efficient firms tend to have higher market-to-book ratios than do other firms that lack environmental strategies. They measure EP through a dummy variable that labels eco-efficient firms as those firms that have the ISO 14001 environ- mental certificate and a CSR report and/or participate in the Business in the

Environment (BiE) and FTSE4Good indices. This definition led to 94 eco-efficient firms. Wang et al. (2014) investigated the relation- ship between greenhouse gas emissions and FP, utilizing a sample of 69 Australian corporations. Their findings contradict Al-Najjar and Anfimiadou's study, as they show that larger Tobin's Q ratios often correlate with higher emissions across all industry sectors. Trumpp and Guenther (2017) measured EP through carbon performance and waste intensity. On the basis of an international sample of 696 firms for the years between 2008 and 2012, they observe a rather weak U- shaped relationship between EP and stock market performance that holds only for the carbon indicator of EP in the subsample of manufacturing firms. The study conducted by Hussain et al. (2018) analyzes a subset of 44 US companies included into the Global For- tune 100 best performing companies for the years between 2007 and 2011. They capture EP by Bloomberg scores on the environmental dimension of ESG performance and also by Global Reporting Initiative (GRI) indicators. Their results indicate that the relationship between Tobin's Q and environmental scores is insignificant and between Tobin's Q and the GRI measure of EP only marginally significant, with a positive sign. With an international sample of 574 multinational companies for the years between 2008 and 2013, Martí- Ballester (2017) reported an insignificant relationship between EP measured by the integration of energy efficiency systems and renewable energy sources and the Tobin Q. Li, Ngniatedema, and Chen (2017) based their analysis on the top 500 publicly traded companies in the United States for the years 2012 and 2013, and they measured EP by productivity indicators (energy, water, carbon, and waste) and also through the green reputation of the firm. They find insignificant relationships between any of these indicators of EP and the market-to-book ratio. A similar conclusion is drawn by Chen, Ngniatedema, and Li (2018) with a multinational sample formed by world top 500 publicly traded companies during the years 2014 and 2015 and utilizing similar measures of EP and FP as in Li et al.

Summing up, prior studies on the relationship between EP and market-based indicators of FP have measured FP through either the Tobin Q ratio or the market-to-book multiple. Moreover, they approach EP very differently, and most of them examined the US con- text. These differences, and also the different research periods used in these studies, likely explain the lack of consensus among these studies. However, and despite these differences, the review of the available evidence does not suggest a strong relationship between EP and market-based indicators of FP. Therefore, given the opposite views expressed in the theoretical papers regarding the EP–FP relationship and the inconclusive results reported by the empirical studies (Tang, Walsh, Lerner, Fitza, & Li, 2018), we do not anticipate the sign of the relationship and formulate the main hypothesis of this study in the null form as follows:

Hypothesis 1. (H1): There is no significant relationship between EP and FP.

One of the distinctive features of the present study compared with most prior research is the international dimension of the sample, which allows us to examine the importance of the institutional setting on the relationship between EP and FP. Firms in different countries feel different levels of environmental regulatory pressures (Howard- Grenville & Hoffman, 2003). Hence, Manrique and Martí- Ballester (2017) argued that stronger regulatory pressures in developed countries provide an important incentive for firms to innovate (Howard-Grenville & Hoffman, 2003) and to obtain competitive advantages by

generating green resources and capabilities. According to the natural resource-based view of the firm (Hart, 1995), greener firms would be better able to differentiate their products than their less green peers. According to Manrique and Martí-Ballester, whereas civil society exerts strong pressures for environmental issues in developed countries (Cui, Liang, & Lu, 2015), the situation in developing countries is characterized by a less intense environmental awareness (Dagher & Itani, 2014). According to this discussion, the major bene- fits in terms of FP derived from the implementation of environmentally friendly strategies should be expected to occur in those countries with more environmentally concerned societies. Focusing on the countries included in our study, given the particularly strong identification of the European civil society with sustainable and ecological concerns (Chams & García-Blandón, 2019), we expect the relationship between EP and FP to be more positive (or less negative) in the European region, and more negative (or less positive) in China, whereas the United States would be in an intermediate position. Accordingly, we pose the second and third hypotheses of the study, as follows:

Hypothesis 2. (H2): The relationship between EP and FP is more positive (or less negative) in the European countries than in other countries.

Hypothesis 3. (H3): The relationship between EP and FP is more negative (or less positive) in China than in other contexts.

METHODOLOGY AND DATA

Methodology
The empirical analysis is based on the regression model depicted by Equation 1 below. The dependent variable PS is defined as the market price of the share divided by the sales per share. A higher value for this multiple indicates that the stock market values more each dollar of sales of the firm. Thus, it standardized the value of the firm in terms of its sales. The variable of interest of this study is ENVSCORE, defined as the score of the firm in the environmental pillar of ESG as provided by the Eikon database.4 This variable intends to capture the EP of the firm, where larger values of ENVSCORE indicate stronger levels of EP.

$$PS_{i,t} = \beta_0 + \beta_1 \cdot ENVSCORE_{i,t} + \sum \beta_k \cdot CONTROLS_{i,t} + \varepsilon_{i,t}. \qquad (1)$$

Taking advantage of the panel structure of the dataset, we estimate Equation 1 by using panel data regression models. Compared with the cross-sectional regression approach used in some prior studies (e.g., Konar & Cohen, 2001), panel data models reduce the possibility of omitted variable bias in the estimations, because the same observations are present in the sample with different values of the dependent and independent variables.5 In that regard, given that the omission of relevant variables constitutes one of the main causes of endogeneity in regression models, the results obtained with panel data estimations can be regarded as more reliable than those obtained with cross-sectional regression.

The control variables included in Equation 1 are based on Damodaran (2010) and constitute the main determinants of PS. According to this author, one of the principal drivers of PS is the net margin of the firm (NETMARGIN), defined as net income divided

by sales. Hence, higher net margins should result in higher values of the firm per every dollar of sales, and therefore, a positive coefficient is anticipated for this variable. Another principal determinant of PS is the expected growth of sales. We intend to control for this issue with the inclusion of the variable GROWTH as a control variable in Equation 1. This variable is computed as the percentage increase in next year sales with regard the current year sales. We also include financial leverage (LEVERAGE), defined as total debt divided by total assets, as an indicator of shareholders risk, as highly leveraged firms are expected to be less valued by the stock market as they involve more risk for shareholders. Consequently, we anticipate a negative coefficient for LEVERAGE. Additionally, given the features of our sample of firms, Equation 1 also includes year, country, and industry fixed effects. All the necessary information for constructing the variables included in Equation 1 has been obtained from Eikon Thomson Reuters database.

According to the aim of this study of providing international evidence of the stock market valuation of a firm's EP, the sample is formed by the largest corporations of America (the United States and Canada), China, and Europe (Denmark, Finland, France, Germany, Ire- land, Netherlands, Norway, Switzerland, and the United Kingdom). The regression model depicted by Equation 1 is estimated first with the whole sample of firms and subsequently with segmented samples. In that regard, four segmented estimations are conducted at the regional level with the American, Chinese, European, and Scandinavian subsamples of firms. The decision to conduct a separate estimation with the Scandinavian subsample of firms (that is also included into the European subsample) is justified by the particularly strong concern regarding environmental matters in this region (Strand, Free- man, & Hockerts, 2015).

Data

The sample for the empirical analysis is constituted by 10% of the largest public firms in each of the countries investigated. This procedure leads to an initial sample of 3,582 firms and, given the 4-year research period, from 2014 to 2017, a total of 14,328 firm-year observations. However, for 7,331 of these observations, the ESG score of the environmental pillar was not available in the Eikon data- base, and therefore, the variable of interest of this study (ENVSCORE) could not be computed. Hence, the final sample consists of 2,034 firms and 6,997 firm-year observations.

Table 1 displays some descriptive statistics for the variables included in Equation 1, winsorized at the 5% and 95% levels to mitigate the potential impact of outliers on the estimates. The table shows that our variable of interest ENVSCORE ranges between a mini- mum value of 19 and a maximum of 91 with an average of 54. On the other hand, the figures for the dependent variable PS indicate that the firms in our sample are quoted, on average, at 3.5 times the sales per share (2.1 times when the calculations are based on median values).

Table 2 displays the pairwise correlation coefficients for the variables included in Equation 1. The most interesting result is the negative and significant correlation between the dependent variable PS and the variable of interest ENVSCORE. Therefore, stronger (weaker) EP is associated with lower (higher) values of PS, indicating that the participants in the stock market seem to have a negative view towards EP. The remaining correlation coefficients for the dependent variable show the predictive

positive and significant correlation with NETMARGIN and GROWTH, as well as the expected negative and significant correlation with LEVERAGE. Therefore, firms with higher margins on sales and with larger expected growth are quoted at larger PS, whereas the contrary holds for firms with higher levels of debt. Focusing on the correlations coefficients for ENVSCORE, the most interesting result is the positive and significant correlation with NETMARGIN that indicates that higher (lower) EP is associated with higher (lower) margins, suggesting a positive relationship between EP and FP, when the latter is measured by accounting-based indicators. On the other hand, there seems to be a trade-off between EP and firm's growth as shown by the negative and significant correlation between ENVSCORE and GROWTH, whereas more indebted firms (LEVERAGE) tend to score better in terms of EP. Finally, the relatively low coefficients between any pair of independent variables included in Equation 1 do not anticipate serious multicollinearity problems in the multivariate analysis.

TABLE 1 Summary statistics

	Mean	SD	p50	p25	p75	Min	Max
PSRATIO	3.451	4.201	2.107	1.057	4.109	0.371	27.612
ENVSCORE	54.382	22.551	55.19	33.96	73.38	19.12	91.39
NETMARGIN	0.107	0.16	0.081	0.035	0.145	−0.212	0.759
GROWTH	0.087	0.191	0.057	−0.017	0.154	−0.223	0.786
LEVERAGE	0.603	0.206	0.612	0.47	0.753	0.113	0.942

TABLE 2 Pairwise correlations with levels of significance

Variables	PSRATIO	ENVSCORE	NETMARGIN	GROWTH	LEVERAGE
PSRATIO	1.000				
ENVSCORE	−0.099***	1.000			
NETMARGIN	0.290***	0.044***	1.000		
GROWTH	0.329***	−0.169***	−0.048***	1.000	
LEVERAGE	−0.349***	0.089***	−0.199***	−0.099***	1.000

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

Table 3 provides detailed information for the country composition of the sample and for the variable of interest ENVSCORE across countries. The table shows that French and Finnish firms show the highest levels of EP, whereas Chinese and US firms present the lowest values. Besides, Canadian firms are just slightly above US firms in terms of EP. Focusing on European countries, the lowest levels of EP are observed for Irish firms.

TABLE 3 Summary statistics for *ENVSCORE* across countries

Country	N	Mean	SD	p50	p25	p75	Min	Max
Canada	493	51.782	20.364	49.1	35.16	68.25	19.12	91.39
China	526	40.597	18.82	36.65	24.155	53.335	19.12	91.39
Denmark	78	64.349	12.398	65.34	54.41	74.92	34.28	87.08
Finland	74	73.798	14.142	72.095	62.07	89.71	44.67	91.39
France	309	79.147	12.412	83.85	71.87	88.59	19.12	91.39
Germany	276	67.125	21.087	71.53	53.405	84.77	19.12	91.39
Ireland	101	57.066	21.411	55.47	39.81	75.22	19.12	91.39
Netherlands	117	63.622	21.674	66.58	52.55	79.93	19.12	91.39
Norway	47	69.471	14.437	71.09	60.31	78.42	38.64	91.39
Switzerland	230	64.767	17.449	66.25	55.06	76.46	19.12	91.39
United Kingdom	773	64.945	18.098	64.8	52.33	79.995	19.12	91.39
United States	3,973	50.009	22.203	47.345	30.13	68.36	19.12	91.39

RESULTS OF THE STUDY

Before conducting the multivariate analysis that will lead to the estimation of Equation 1, we conduct a preliminary univariate analysis of mean and median differences of the dependent variable PS between the best and worst environmental performers. Hence, we define the new variables HIGHEP (best environmental performers) and LOWEP (worst environmental performers) to label, in the case of HIGHEP, the firms in the first quartile of ENVSCORE, and in the case of LOWEP, the firms in the last quartile. The t-test is utilized to assess the level of significance of mean differences of PS, whereas the Mann–Whitney test is conducted for the assessment of median differences. Table 4 summarizes the results of this analysis. For the whole sample, the table shows that firms with stronger EP (with HIGHEP = 1) are quoted at significantly lower mean and median PS than other firms. In the same vein, firms with weaker EP (with LOWEP = 1) are quoted at higher multiples than other firms. These results are consistent with the negative correlation between PS and ENVSCORE observed in Table 2 and support that the stock market values more (less) those firms with lower (higher) levels of EP. Next, Table 4 replicates the univariate analysis at the regional level, showing rather similar results. It should be noted, however, that these differences are less significant for European firms, and particularly, for firms from the Scandinavian region.

Table 5 displays the results of the estimation of Equation 1. The first column shows the estimates with the whole sample, whereas the remaining columns depict the results of the estimations performed with segmented samples by region. Estimations are conducted with panel data models with random effects. Because a preliminary estimation of Equation 1 reveals that the residuals of the estimation are heteroscedastic, the significance tests of the coefficients of the independent variables are performed with robust standard errors. Besides, the assessment of the variance inflation factors (untabulated) confirms the lack of multicollinearity problems in our dataset anticipated by the correlation coefficients in Table 2 (average value of 1.05 with a maximum of 1.06).

A first issue to stress is the relatively high explanatory ability of the proposed model, with R2 ranging between 44% in the estimation conducted with the whole sample and 57% in the estimation with the Scandinavian subsample. Focusing on the estimation with the whole sample, the most interesting result in column (1) is the negative and significant coefficient of ENVSCORE (p-value < 0.01). This indicates that firms with stronger levels of EP are quoted at significantly lower PS multiples than are other firms. This result is consistent with both the negative correlation between PS and ENVSCORE observed in Table 2 and also with the results of the univariate analysis displayed in Table 4. Consequently, the first hypothesis of this study, formulated in the null form, is rejected as we observe a significantly negative association between EP and FP. In the estimations conducted at the regional level, we report significant results for the subsamples of American (in Column (2)) and Chinese firms (in Column (3)), although in the latter case, the coefficient associated with ENVSCORE is only marginally significant (p-value < 0.10). This indicates that the negative relationship between ENVSCORE and PS depicted in Column (1) is driven by American firms and, in a lesser extent, by Chinese firms. Conversely, in the estimations conducted with European firms (displayed in Columns (4) and (5)), ENVSCORE presents insignificant coefficients in both cases, denoting that EP is not negatively considered by the participants in the stock market. In

fact, ENVSCORE presents positive coefficients in both estimations, suggesting a positive view towards EP, although in both cases the coefficient is insignificant. Therefore, these results provide support for the hypothesis H2 (a more positive or less negative relationship between EP and FP in Europe than in China or America) but not for H3 (a more negative or less positive relationship between EP and FP in China than in Europe or America).

TABLE 4 Mean and median values of *PS*, with significance values, by levels of EP

		Mean	Median
All countries			
HIGHEP = 0	5,270	3.633	2.235
HIGHEP = 1	1,727	2.894	1.754
Sig. level		*p* < 0.01	*p* < 0.01
LOWEP = 0	5,298	3.333	2.046
LOWEP = 1	1,699	3.816	2.370
Sig. level		*p* < 0.01	*p* < 0.01
America			
HIGHEP = 0	3,613	3.865	2.370
HIGHEP = 1	853	2.907	2.062
Sig. level		*p* < 0.01	*p* < 0.01
LOWEP = 0	3,108	3.581	2.244
LOWEP = 1	1,358	3.911	2.459
Sig. level		*p* < 0.05	*p* < 0.01
China			
HIGHEP = 0	490	2.706	1.360
HIGHEP = 1	36	1.146	0.843
Sig. level		*p* < 0.01	*p* < 0.01
LOWEP = 0	403	2.169	1.260
LOWEP = 1	226	3.201	1.602
Sig. level		*p* < 0.01	*p* < 0.1
Europe			
HIGHEP = 0	1,167	3.304	2.050
HIGHEP = 1	838	2.957	1.515
Sig. level		*p* < 0.1	*p* < 0.01
LOWEP = 0	1,882	3.113	1.750
LOWEP = 1	123	3.855	2.415
Sig. level		*p* < 0.1	*p* < 0.01
Scandinavia			
HIGHEP = 0	125	2.729	2.112
HIGHEP = 1	74	3.287	1.320
Sig. level		*p* < 0.1	

Abbreviation: EP, environmental performance.

As discussed in the second section of the paper, the related literature has provided inconclusive results about the sort of relationship between EP and FP (Endrikat et al., 2014). Several factors may explain the inconsistency of empirical finding. Hence, differences in the con- texts examined by the empirical studies make the comparability of their results extremely difficult. When we compare our findings, for example, with those reported in some of the available meta-analyses, we must take into account that some of the studies covered in these meta-analyses examine research periods dating as far back as the 1970s.6 In our view, given that the society's concern towards environmental issues is a very dynamic issue, the empirical evidence reported for such distant periods does not tell much about the current relationship between EP and FP. Similarly, the different countries or regions investigated by prior studies can also explain the lack of consensus in the literature. In that regard, Albertini (2013) and Dixon-Fowler et al. (2013) came to the conclusion that the firm's home country is an important moderator factor of the impact of EP on FP. The different results reported in this paper for the United States, China, and Europe provide support for this view. Apart from the different

institutional setting investigated by prior studies, Albertini find that the different measures used for capturing EP and FP also explain the different results reported by these papers. That being said, our findings are in line with those of some of the more recent studies that have shown negative or insignificant relationships between EP and market-based indicators of FP (Chen et al., 2018; Li et al., 2017; Martí-Ballester, 2017; Wang et al., 2014).

With regard to the control variables, Table 5 shows significant effects for GROWTH (in all the estimations), NETMARGIN (only in the estimations with Chinese and Scandinavian firms), and LEVERAGE (in all the estimations, except China). Beyond the rather high explanatory power of the models as shown by the R2 values, the fact that in all the cases, whenever a significant coefficient is reported for a control variable, it always has the predicted sign, which also constitutes a proof of soundness of the empirical analysis.

Endogeneity is always an issue in the investigation of the effects of EP on FP. In our specific case, and given the nature of the dependent variable (PS) and the variable of interest (ENVSCORE) in Equation 1, one should not discard the presence of potential endogeneity in our model, which may diminish the soundness of the reported results. Similar to the discussion of endogeneity in the relationship between social performance and FP in Garcia-Castro, Ariño, and Canela (2010), the decision of the firms' managers to improve EP may also be endogenous. For example, this decision could be correlated with some omitted unobserved firm specific variables such as the culture of the firm or the management's ethical attitudes and values. According to Hsiao (2007), panel data models reduce the possibility of omitted variables bias compared with cross-sectional regression and, consequently, the possibility of endogeneity problems in the estimations. Nevertheless, to further elaborate on this issue, we have con- ducted the Durbin–Wu–Hausman endogeneity test. Accordingly, we estimate a regression model with EP as the dependent variable and a set of exogenous variables, including the size of the firm and some measures of the firm's quality of governance, among the regressors. Afterwards, we reestimate Equation 1 after including the residuals of the former estimation as an additional independent variable. The results of the new estimation (untabulated) do not suggest serious endogeneity problems associated with EP in our model, as the coeffi- cient of the new variable accounting for the residuals is insignificant, whereas EP maintains the same negative sign and level of significance as in Table 5. Therefore, we conclude that the results reported in Table 5 do not seem to be affected by endogeneity.

Table 6 depicts the results of the estimation of Equation 1 with LOWEP and HIGHEP as the indicators of EP in substitution of ENVSCORE. The aim of this analysis is to assess the robustness of the findings to the form of constructing the measures of EP. The positive and significant coefficient of LOWEP in the main estimation in Column (1), as well as in the estimations with the American and Chinese sub- samples, denotes that firms with poorer levels of EP are traded at higher multiples than other firms. On the other hand, the results for HIGHEP indicate that with the exception of the American subsample, and only at marginal levels of significance (p-value < 0.10), firms with stronger EP are not quoted at significantly different multiples than other firms. These results are consistent with those reported in Table 5, in showing that the negative relationship between EP and market value is mainly driven by American firms and, in a lower extent by Chinese firms, whereas for European firms, this relationship becomes

again insignificant. Additionally, the weaker results for HIGHEP compared with LOWEP also reveal that the relation between EP and the market value of the firm is mainly driven by less environmentally committed firms that are quoted with a premium, whereas more environmentally compliant firms are not penalized in terms of PS.

TABLE 5 Results of the estimation of the model with standard errors in parentheses

	(1)	(2)	(3)	(4)	(5)
Variables	All countries	America	China	Europe	Scandinavia
ENVSCORE	−0.00868*** (0.00245)	−0.0128*** (0.00266)	−0.0101* (0.00541)	0.000473 (0.00622)	0.0146 (0.0111)
GROWTH	3.686*** (0.334)	3.627*** (0.390)	2.846*** (0.863)	4.493*** (0.729)	0.868** (0.348)
NETMARGIN	−0.453 (0.909)	−0.168 (0.848)	5.173** (2.227)	−1.871 (2.136)	2.462* (1.374)
LEVERAGE	−4.343*** (0.496)	−4.095*** (0.636)	−2.074 (1.428)	−4.929*** (0.856)	−4.141*** (1.515)
Constant	5.956*** (0.415)	6.040*** (0.502)	2.804** (1.190)	4.843*** (0.877)	5.017*** (1.867)
Year FE	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	No	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
R^2	0.4361	0.4765	0.5153	0.5526	0.5728
Observations	6,997	4,466	526	2,005	199
Number of firms	2,034	1,317	171	546	56

Note: Robust standard errors in parentheses.
***$p < 0.01$.
**$p < 0.05$.
*$p < 0.1$.

TABLE 6 Results of the estimation of the model with standard errors in parentheses

	(1)	(2)	(3)	(4)	(5)
Variables	All countries	America	China	Europe	Scandinavia
LOWEP	0.361*** (0.108)	0.456*** (0.131)	0.336** (0.154)	0.113 (0.368)	
HIGHEP	−0.0452 (0.0709)	−0.180* (0.0935)	−0.0198 (0.193)	0.128 (0.121)	−0.0650 (0.187)
NETMARGIN	−0.482 (0.905)	−0.224 (0.841)	5.243** (2.230)	−1.858 (2.134)	2.622* (1.385)
GROWTH	3.690*** (0.331)	3.626*** (0.384)	2.842*** (0.866)	4.498*** (0.724)	0.960*** (0.347)
LEVERAGE	−4.356*** (0.496)	−4.119*** (0.638)	−2.025 (1.425)	−4.949*** (0.860)	−3.982*** (1.477)
Constant	5.432*** (0.404)	5.304*** (0.488)	2.232* (1.194)	4.833*** (0.788)	3.036* (1.678)
Year FE	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	No	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Observations	6,997	4,466	526	2,005	199
Number of firms	2,034	1,317	171	546	56
R^2	0.4354	0.4751	0.5159	0.5531	0.5561

Note: Environmental performance (EP) is measured by LOWEP and HIGHEP. Robust standard errors in parentheses.
***$p < 0.01$.
**$p < 0.05$.
*$p < 0.1$.

Some scholars argue that relationship between EP and FP might be curvilinear (Barnett & Salomon, 2006, 2012; Misani & Pogutz, 2015; Trumpp & Guenther, 2017). These authors provide arguments supporting both a U-shaped EP–FP and an inverted U-shaped EP–FP relationship. Barnett and Salomon (2012) hypothesized a U-shaped curve on the basis of an initially negative relation- ship between EP and FP when the firm starts to improve its EP, because at these relatively low levels of EP, the costs of improving EP more outweigh the benefits (the so-called too-little-of-a-good- thing effect). However, beyond a certain threshold of EP, the benefits of further improvements in EP will eventually exceed the costs, resulting in the upward slope of the U-shaped curve. On the other hand, Trumpp and Guenther (2017) conjectured an inverted U- shaped relationship (the so-called too-much-of-a-good-thing effect), on the basis of the law of diminishing marginal returns. They argue that once the firm reaches the level of EP that

maximizes FP, further improvements of EP will necessarily result in lower FP. Whereas fol- lowing Nuber, Velte, and Hörisch (2020), most empirical studies have provided evidence of a U-shaped relationship (Nuber et al., 2020, for Germany; Wang, Lu, Ye, Chau, & Zhang, 2016, for a sample of inter- national construction corporations; Trumpp & Guenther, 2017, for an international sample of service and manufacturing firms), there is also evidence of an inverted U-shaped relationship (Han, Kim, & Yu, 2016, for Korea; Misani & Pogutz, 2015, for an international sample). Following these prior studies, we investigate the existence of a curvilinear relationship in the context of our study. Therefore, we have reestimated Equation 1 after including the new variable ENVSCORE2 (defined as the squared value of ENVSCORE) accompanying ENVSCORE as an additional variable of interest. The results of the new set of estimations are reported in Table 7. In the estimation conducted with the whole sample displayed in Column (1), the sign and levels of significance of the coefficients of ENVSCORE and ENVSCORE2 provide support for the U-shaped relationship between EP and FP reported by most prior related studies. However, in the estimations conducted with segmented samples, this sort of relationship only holds for the subsample of Chinese firms. Therefore, we conclude that the U-shaped relationship between EP and FP seems to be driven by these firms.

The last additional analysis of this study addresses the robustness of the results on the relationship between EP and FP reported so far to a different measure of FP. Given that the aim of this study is to examine how the stock market values a firm's EP, and the fact that most prior related studies on the relationship between EP and market-based indicators of FP have used the Tobin Q ratio for capturing FP (e.g., Hussain et al., 2018; Konar & Cohen, 2001; Wang et al., 2014), we have chosen this multiple as an alternative measure of FP. It should be noted, however, that, as discussed before in the paper, this alternative does not seem to be as robust as the PS multiple in cross-country studies. Table 8 displays the results of the estimation of Equation 1, after substituting the original dependent variable PS by TOBINQ (computed as the ratio between the market value of the company and the book value of assets) as the new indicator of FP. As in the former estimations for PS, panel data estimations are per- formed and significant tests are computed with robust standard errors. Similar to Tables 5–7, Column (1) presents the results of the estimation with the whole sample, whereas the remaining columns refer to the estimations conducted at the regional level. The principal result in Table 8 is the negative and statistically significant coefficient of ENVSCORE (p-value < 0.05) in the estimation conducted with the whole sample. This result indicates that more (less) environmentally concerned firms are quoted at significantly lower (higher) Tobin's Q ratios, suggesting that the participants in the stock market have a negative view towards EP. This result is consistent with the evidence reported in Tables 5–7, when FP was measured by PS. In the remaining analyses displayed in Table 8 with regional subsamples, ENVSCORE presents significant coefficients only in the estimation conducted with the American subsample. Therefore, it indicates that the negative relationship between EP and FP is driven by the American region. This result is also strongly consistent with the figures dis- played in Tables 5–7, which also showed insignificant coefficients for ENVSCORE in the estimations conducted with both the European and Scandinavian subsamples, whereas in the estimation for China, ENVSCORE was only marginally significant (p-value < 0.10). Finally, both the relatively high explanatory power of the model compared with prior related studies also based on

the Tobin Q (e.g., Hussain et al., 2018; Konar & Cohen, 2001; Wang et al., 2014) and the fact that all the control variables present statistically significant coefficients, in all cases with the predicted sign, indicate that these results can be regarded as sound and robust.

TABLE 7 Results of the estimation of the model with standard errors in parentheses

Variables	(1) All countries	(2) America	(3) China	(4) Europe	(5) Scandinavia
ENVSCORE	−0.0259*** (0.00959)	−0.0225* (0.0121)	−0.0460*** (0.0166)	−0.0208 (0.0294)	0.0636 (0.0539)
ENVSCORE2	0.000161* (8.39e−05)	9.19e−05 (0.000108)	0.000394** (0.000163)	0.000175 (0.000222)	−0.000383 (0.000405)
NETMARGIN	−0.454 (0.908)	−0.170 (0.848)	5.263** (2.198)	−1.863 (2.136)	2.537* (1.332)
GROWTH	3.683*** (0.334)	3.621*** (0.388)	2.844*** (0.859)	4.494*** (0.729)	0.908** (0.358)
LEVERAGE	−4.337*** (0.496)	−4.090*** (0.635)	−2.104 (1.411)	−4.940*** (0.858)	−4.237*** (1.539)
Constant	6.343*** (0.488)	6.257*** (0.610)	3.538*** (1.183)	4.341*** (0.807)	1.407 (2.381)
Year FE	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	No	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Observations	6,997	4,466	526	2,005	199
Number of firms	2,034	1,317	171	546	56
R^2	0.4361	0.4762	0.5203	0.5529	0.5752

Note: Environmental performance (EP) is measured by ENVSCORE and ENVSCORE2. Robust standard errors in parentheses.
***$p < 0.01$.
**$p < 0.05$.
*$p < 0.1$.

TABLE 8 Results of the estimation of the model with standard errors in parentheses

Variables	(1) All countries	(2) America	(3) China	(4) Europe	(5) Scandinavia
ENVSCORE	−0.00184** (0.000753)	−0.00225** (0.000903)	−0.00135 (0.00256)	8.67e−05 (0.00177)	0.00703 (0.00471)
NETMARGIN	0.465*** (0.0828)	0.472*** (0.104)	0.477 (0.340)	0.541*** (0.161)	1.072* (0.625)
GROWTH	0.309*** (0.0456)	0.434*** (0.0716)	0.193** (0.0867)	0.187*** (0.0659)	0.229 (0.156)
LEVERAGE	−0.319* (0.169)	−0.426** (0.177)	−1.425*** (0.443)	0.319 (0.425)	−0.927 (0.596)
Constant	1.711*** (0.129)	1.742*** (0.137)	2.251*** (0.393)	1.104*** (0.351)	0.388 (0.658)
Year FE	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	No	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Observations	6,997	4,466	526	2,005	199
Number of firms	2,034	1,317	171	546	56
R^2	0.3364	0.3340	0.5627	0.3348	0.6081

Note: Financial performance (FP) is measured by the Tobin Q ratio. Robust standard errors in parentheses.
***$p < 0.01$.
**$p < 0.05$.
*$p < 0.1$.

CONCLUSIONS, IMPLICATIONS, AND LIMITATIONS

The main conclusion of this study is that there exists a strong and negative relationship between EP and stock market indicators of FP. The results of the univariate analysis indicate that firms with higher (lower) levels of EP are valued at lower (higher) PSs than other firms. Additionally, the analysis of correlations supports the results of the univariate analysis, as it shows a strong and negative correlation between EP and PSs. Most importantly, the multivariate analysis shows that, after controlling for the main drivers of the PS, high (low) EP is significantly associated with low (high) multiples. The negative relationship between both types of performance consistently holds across several analyses and robustness checks.

A second interesting conclusion is that the negative relationship between EP and FP does not hold uniformly across regions, and it is mainly driven by American and, in a

lower extent, Chinese firms, whereas for European firms (and also for the subsample of Scandinavian firms), the relationship between both types of performance becomes insignificant. The different sort of relationship observed across regions may explain the lack of consensus shown by prior studies, as they have generally investigated different settings. Moreover, we also provide some evidence of a U-shaped relationship between EP and FP.

Summing up, we consider the main result of this study that there exists a negative relationship between EP and stock market indicators of FP as sound and robust. An interesting implication of our results is the relevance of the firm's home country to understand this relation- ship. However, even in the Scandinavian region, which is regarded as the most advanced area with regard to the importance of environ- mental issues, the participants in the stock market do not seem to have a positive view towards EP. Therefore, the negative assessment of the stock market towards EP appears as a potential deterrent for achieving more environmentally committed firms, making it difficult to accomplish the United Nations' Sustainable Development agenda.

Interestingly, our results also show a significantly positive correlation between EP and the net margin of the firm, the latter providing n accounting measure of FP. This suggests that the negative view of the participants in the stock market towards EP would not be explained by a supposedly negative impact of the resources invested in enhancing the EP of the firm on its level of profitability. Further research on this issue would be particularly welcome.

The main limitation of this study is that we have measured EP exclusively by the scores provided by Eikon Thomson Reuters data- base. To what extent the results reported here would be robust to alternative measures of EP provides an interesting extension of this study.

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