

RESEARCH ARTICLE

Embedding sustainability in risk management: The impact of environmental, social, and governance ratings on corporate financial risk

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Abstract

This study investigates the effect of corporate social and environmental evaluation on investors' risk perception to explore the potential market risk for public companies that adopt a sustainable and responsible corporate strategy. We referred to the triple corporate assessment according to environmental, social, and governance (ESG) criteria to check whether ESG factors—meant to direct firms toward social and environmental needs—improve corporate market performance or trigger, among investors, a perception of “window dressing.” In doing so, we tested the impact of corporate social performance—proxied by an ESG assessment—on corporate financial risk using double risk measurement. We conducted a five-year longitudinal study (fiscal years 2014–2018) of 222 companies listed on the Standard & Poor's index. The empirical findings show higher investor uncertainty regarding corporate sustainability performance, probably due to the misalignment of objectives between investors and investees. Indeed, an overall ESG assessment corresponds to higher systematic risk for firms, and a corporate environmental rating has an upward effect on the same risk dimension.

KEYWORDS

corporate financial risk, corporate social responsibility, corporate sustainability, environmental, social, and governance, window dressing

JEL CLASSIFICATION

G11, D81, M14

1 | INTRODUCTION

In recent decades, corporate social responsibility (CSR hereinafter) has gained increasing attention from companies, the financial community, regulators, and policymakers (Bouslah et al., 2013). Nowadays, several companies are willing to integrate socially responsible practices into different aspects of their businesses.

Indeed, CSR helps align firms' strategies with social needs, building a positive corporate image and a stricter relationship with related stakeholders. However, the theoretical and practical debate on what it means to promote the effective sustainability and responsibility of the financial system is still ongoing.

Many researchers have attempted to assess CSR-related non-financial benefits (Wood, 1991; Waddock and Graves, 1997; Bouslah

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et al., 2013). For instance, Wood (1991) defined corporate social performance (CSP hereinafter) as the “configuration of the principles of social responsibility, processes of social responsiveness, and policies, programs, and observable outcomes as they relate to the firm’s societal relationships” (Wood, 1991: 693). Recently, CSP has been measured by the so-called environmental, social, and governance factors (ESG paradigm), and it has rapidly become widely accepted by researchers (Chang et al., 2014; Eccles et al., 2014) and capital markets (Bassen and Senkl, 2011).

Therefore, the literature on CSR research focuses on the relationship between CSP and corporate financial performance (CFP), and the results are ambiguous owing to the different methods and measures (Margolis and Walsh, 2003; Orlitzky et al., 2003; Margolis et al., 2007; Oikonomou et al., 2012; Endrikat et al., 2014). Some studies have highlighted a positive CSP-CFP relationship (Hillman and Keim, 2001), while others have indicated a negative link (Brammer et al., 2006) as well as a non-significant association (Renneboog et al., 2008).

To overcome these limitations, some authors have restricted their studies to a specific industrial context (Brammer and Pavelin, 2006), since CSP is context-driven and depends on the external environment (Jiraporn et al., 2014). In particular, Brammer and Pavelin (2006) showed that stakeholders engaging in industrial sectors with negative externalities develop a wider skepticism about CSR activities; therefore, firms’ reputations could rise once they perceive CSR efforts as genuine. Indeed, business stakeholders develop more stringent expectations regarding firms’ social behavior as they recognize CSR activities as a mere “window dressing” attempt to legitimize questionable practices (Palazzo and Richter, 2005). In contrast, some firms disclose CSR activities (Dhaliwal et al., 2012) to hide their bad practices and become more transparent. Hence, CSR commitment can improve a firm’s financial performance by providing “insurance-like protection” (Godfrey, 2005; Godfrey et al., 2009) and lowering information asymmetry.

Despite the academic debate about the nature of the CSP-CFP relationship being still open, these studies often leveraged only accounting-based measures to assess financial performance, without considering the firm’s total risk as a proxy to estimate its market success. On this ground, Orlitzky and Benjamin (2001), in a meta-analytic review of 18 US-based companies covering a period from 1978 to 1995, identified a stronger negative impact from CSP on market risk measures than on accounting-based ones. Indeed, from a managerial perspective, the focus should not only be on financial performance levels but also their variability (i.e., firm risk), especially over a highly volatile market condition.

Accordingly, this study attempts to fill these gaps in the literature by exploring the relationship between companies’ ESG assessments and their risk exposures. Specifically, we have attempted to understand whether corporate risk could be affected by corporate sustainability in the stock exchange market, both from the systematic and total risk perspectives.

First, we examine the association between the individual factors of CSP according to the different ESG dimensions (environmental,

social, and governance) and the firm’s risk exposure. Second, we explore how an overall ESG assessment may influence financial risk. In line with several previous studies (Mackey et al., 2007; Fama and French, 2007), we measured investors’ risk perception considering both the systematic and total risk perspectives.

The empirical findings show higher investor uncertainty regarding corporate sustainability performance, probably due to the occurrence of the green- and social-washing phenomena or the misalignment of objectives between investors and investees. Indeed, an overall ESG assessment increases investors’ risk perception, as well as corporate environmental practice, which has an upward effect on firms’ systematic risk.

2 | PRIOR LITERATURE

2.1 | CSR compliance in risk management

In recent years, CSR has played a central role in corporate decision-making and strategies. According to the stakeholder management approach, while low CSR might lead to lawsuits and legal fines, high CSR commitment could improve government and financial community relations (McGuire et al., 1988). Indeed, in addition to a sharper focus on reputation building, managers are increasingly considering firms’ fiduciary and moral responsibilities toward stakeholders (Cai et al., 2011; Taghian et al., 2015). Moreover, several studies have analyzed various benefits of CSR engagement according to different managerial and business pathways: companies may receive more favorable assessments from financial analysts (Hong and Kacperczyk, 2009; Cheng et al., 2014) and/or a better credit rating (Attig et al., 2013). Conversely, CSR commitment can improve (a) quality of communication with investors about financial issues (Fieseler, 2011), (b) corporate governance, heightening a firm’s value (Jo and Harjoto, 2012), (c) analysts’ forecast accuracy (Dhaliwal et al., 2012), and (d) the cost of equity in financial markets (El Ghouli et al., 2011). Therefore, the CSR issue has aroused growing interest in the field of studies relating to two interconnected research lines: one, business performance and economic value and two, risk management (Albinger and Freeman, 2000; Benlemlih et al., 2018; Brogi and Lagasio, 2019; Boutin-Dufresne and Savaria; Capelli et al., 2021; Chava, 2014; Fatemi et al., 2015; Flammer, 2015; Giese et al., 2019; Kölbel et al., 2017; Sciarrelli et al., 2020, 2021).

This bridge between CSR and typical financial arguments depends on the fact that even investors are more likely to allocate capital to socially responsible companies; hence, CSR engagement can lower financial constraints for companies and increase their equity fundraising (Chang et al., 2014). This empirical evidence supports the assumption that the higher the CSR, the lower the investor risk perception (Oikonomou et al., 2012).

The ESG goals have created new scientific and managerial challenges for several subjects. One of these concerns risk management models: The goals of ESGs have assumed increasing importance in aligning the risk management framework within an economic context

increasingly influenced by issues related to CSR. In recent scientific papers, the relationship between CSR and risk has deepened in terms of reworking traditional risk management models. For example, Capelli et al. (2021) argue that CSR risk analysis can improve financial risk assessment by integrating traditional risk management models with entropy analysis related to ESGs. This conclusion is consistent with the general idea that VaR (Value at Risk) models should be continually revised because of the arising of new independent variables that affect the volatility of stock prices (Bloomberg, 2011; Berkowitz and O'Brien, 2002).

An important variable to control from a risk management perspective is information on the company's capacity to comply with CSR objectives. In other words, to understand the effect of CSR on risk and uncertainty perceived by investors, the information spread about the achievement of CSR goals plays a crucial role. Although there is no clear view about the association between CSR engagement and information asymmetry, it has been generally recognized that a deeper commitment toward the external context tends to reduce investor risk and uncertainty (Boutin-Dufresne and Savaria, 2004). According to a stakeholder management perspective, companies might achieve their objectives more easily if they acquire a good reputation for their external environment (González Sánchez and Morales de Vega, 2018).

From a risk management perspective, it can be argued that CSR engagement produces “insurance-like effects” on the firm's stock price (Godfrey, 2005; Godfrey et al., 2009). The notion of insurance-like effects refers to how, on the occurrence of a negative event linked to corporate activities, CSR engagement can reduce any potential impact on the stock price; thus, CSR commitment can be viewed “as an insurance premium that the firm pays to avoid, or reduce, any loss of market value as a result of such negative events” (Shiu and Yang, 2017: 456). Indeed, Peloza (2006) showed that CSR engagement can act as insurance for corporate performance during volatile times, such as recessionary periods or unexpected negative firm-specific events. Therefore, since CSR practices are not perceived as self-serving strategies, investors will ascribe moral value to these activities (Godfrey, 2005). Moral capital protects firms against loss by moderating the effects of a corporate negative assessment (Godfrey, 2005), thereby acting as a buffer against reputation risk (Minor and Morgan, 2011).

On this ground, previous studies have suggested that CSR activities can increase a firm's reputation (Albinger and Freeman, 2000; Greening and Turban, 2000), which in turn is particularly relevant in whether they are institutional players in the financial market (Cui et al., 2018). Thus, the “reputation-building process” shows that high CSR firms are associated with a better information environment that can preserve their reputation capital over time.

The aforementioned arguments presuppose a capital market characterized by the high efficiency and rationality of both investors and non-financial stakeholders. In other words, the idea that a CSR orientation involves a sort of buffer against the risk of adverse conditions is consistent with the neoclassical perspective. By contrast, in contexts other than those theorized from the neoclassical perspective,

problems of information asymmetry and/or irrational behavior could mitigate or reverse the relationship between perceived risk and CSR.

2.2 | CSR effects on investor risk perception

The empirical examination of the CSR-information asymmetry nexus is crucial, as it could provide several implications for risk management, accounting, economics, finance, management, and other business studies as well (Cui et al., 2018). Several studies in the field of both micro- and macro-finance assume market equilibrium conditions and, therefore, perfect information symmetry between investors and firms. In practice, however, managers often possess more information than do outside stakeholders. This offers important implications for CSR because managers know more about firms' corporate goals, plans, programs, and related activities than do external stakeholders. Therefore, from an investor perspective, CSR activities might be a forecasting tool for understanding companies' future activities and strategies to mitigate perceived uncertainty (Ramchander et al., 2012). Similarly, firms could adopt CSR practices to increase their legitimacy in the external context, seeking to influence stakeholders' behavior and creating a positive corporate image (Brown and Dacin, 1997).

Hence, many researchers have elucidated the capability of socially responsible behavior to improve transparency, thus lowering investors' perceived risk (McGuire et al., 1988; Diamond and Verrecchia, 1991; Orlitzky and Benjamin, 2001; Godfrey, 2005; Godfrey et al., 2009; Oikonomou et al., 2012; Kim et al., 2014). Indeed, the additional information availability tends to reduce the asymmetries between the company and investors, thereby mitigating risk perception (Orlitzky and Benjamin, 2001; Czerwinska and Kaźmierkiewicz, 2015).

As highlighted previously, an increasing number of companies have started engaging regularly in CSR activities in response to the call from society for greater corporate citizenship. Indeed, some studies consider CSR an important tool of strategic investment, and as such, it should be a means of reputation handling (Fombrun and Shanley, 1990; McWilliams et al., 2006).

Godfrey (2005) designed a theoretical model to explain why social activities can build a positive reputation and moral capital for stakeholders. He argued that stakeholders, and particularly the investors, tend to evaluate firms' efforts in social activities, mitigating any adverse judgment on their practices and “thereby creating a case for leniency in any punishment that may be considered” (Shiu and Yang, 2017, p. 458). Even Godfrey et al. (2009) found general support for the risk management view that CSR can create value for investors by lowering uncertainty in their investment decision-making.

Conversely, other scholars consider CSR simply to be a means of destroying firm value. Indeed, according to Hill (2001), CSR engagement might be perceived as unethical from the investor side and it might “alienate the organization from the rest of society, resulting in reduced reputation, increased costs, and decreasing shareholder value through erosion of its license to operate” (Hill, 2001, p. 32).



This alternative explanation implies that “companies’ stakeholders see through the CSR activities as negligible and their efforts fall flat or backfire in the end” (Jo and Na, 2012, p. 444). In other words, investors perceive CSR-related policies and initiatives as a way to circumvent unethical situations and practices (Lindgreen et al., 2012).

Similarly, Palazzo and Richter (2005) stated that companies might strategically leverage CSR strategies to legitimize questionable business. Scholars have framed this perspective as the “window dressing” explanation (Palazzo and Richter, 2005; Cai et al., 2012). From the window-dressing perspective, we can assume that if investors realize managers’ true intentions of personal reputation building, they penalize those companies in the stock market; therefore, CSR engagement might increase investor uncertainty in their decision-making (Jo and Na, 2012). Consequently, firms may neither leverage CSR as a long-term strategy to shape their core business nor use it to reduce their negative externalities and unfavorable public perception. Hence, firms’ efforts toward social activities may backfire because stakeholders and investors recognize companies’ true intentions.

However, firms could simply follow the current trend of CSR engagement “without any true intention of deceiving stakeholders or value generation” (Cai et al., 2012, p. 467). Thus, companies could be interested neither in reputation building nor in value enhancement (McWilliams and Siegel, 2006). Therefore, although CSR engagement may bolster investors’ positive attributions toward companies, the risk-reduction strategy could backfire because of investors’ skepticism about business activities (Jo and Na, 2012). Indeed, market actors consider CSR efforts neither harmful nor beneficial, but simply value-irrelevant activities (Cai et al., 2012). This is consistent with Modigliani and Miller’s (1963) value-irrelevance theorem and corroborates those researchers who found no significant relationship between CSR and investor risk (Aupperle et al., 1985; Rahman et al., 2018; Camodeca et al., 2018). Hence, under the value-irrelevance hypothesis, it should be assumed that investors do not reward firms’ CSR engagement in the financial market.

2.3 | Research gaps and hypotheses development

As highlighted previously, several companies are now willing to integrate socially responsible practices into different aspects of their businesses. Indeed, CSR aligns firms’ strategies with social needs, building a positive corporate image and a stricter relationship with consumers and related stakeholders. On this basis, many researchers have tried to assess CSR-related non-financial positive outcomes (Wood, 1991; Waddock and Graves, 1997; Bouslah et al., 2013). Wood (1991) defined social performance as the “configuration of the principles of social responsibility, processes of social responsiveness, and policies, programs, and observable outcomes as they relate to the firm’s societal relationships” (Wood, 1991, p. 693).

The literature has demonstrated multiple ways in which CSR can produce positive externalities. For instance, CSR can be used to differentiate corporate strategies (Porter and Kramer, 2006; Sen and Bhattacharya, 2001; Lii and Lee, 2012). It also provides benefits in

terms of recruitment and talent retention (Glavas and Kelley, 2014). Additionally, CSR strategies lead to better financing conditions (Cheng et al., 2014) and credit rating improvements (Jiraporn et al., 2014). CSR also helps better manage and reduce investors’ risks, guaranteeing an “insurance-like” effect (Godfrey et al., 2009). Therefore, managers now voluntarily leverage CSR practices to improve investors’ judgments of their companies (Elliott et al., 2017). Indeed, according to Guenster et al. (2011), a growing number of investors tend to address their capital toward firms that pursue specific CSR activities. On this basis, we can assume that CSR is an intangible resource that reduces economic uncertainty and investor risk perception, thereby enhancing a firm’s value (Lourenço et al., 2014).

As shown in the prior literature, the question of whether CSR can become a strategic tool in an investment portfolio has led several researchers to focus on its risk-reduction effect. Some studies state that CSR enhances firm moral capital, which in turn provides investors with “insurance-like protection” (Godfrey, 2005; Godfrey et al., 2009). Conversely, other authors argue that CSR tends to destroy firm value, according to the “window dressing” explanation. Additionally, some scholars have noted that there is no significant association between CSR engagement and investor risk (Cai et al., 2012), since investors perceive CSR efforts as value-irrelevant activities that firms apply to preserve their market position. However, to date, no empirical studies have dealt with the relationship between CSR practices and investor risk perception from an ESG perspective, although its adoption to assess CSR is being increasingly accepted by researchers (Chang et al., 2014; Eccles et al., 2014) and financial markets (Bassen and Senkl, 2011).

Hence, we have tried to fill this gap in the extant literature by exploring the impact of ESG assessments on investor risk perception, formulating the following hypothesis:

Hypothesis 1. There is a relationship between the overall ESG assessment and investor risk perception.

Investors might perceive the relevance of the three ESG dimensions differently as it could depend on the sector to which the company belongs (Eccles et al., 2012; Sassen et al., 2016). This might cause different market reactions to ESG activities (Eccles et al., 2011). On this basis, Eccles et al. (2012) argued that the weight of each ESG pillar should be related to its relevance within the company’s value-creation process. In line with this argument, the impact of ESG dimensions on investor risk perception could depend on industry-specific peculiarities. Prior studies have suggested that fitting ESG performance within various industry contexts may explain such differences in this relationship (Brammer and Pavelin, 2006). The different perceived relevance of the ESG components within the investment community could also be due to other levels of measurability and reliability of information (Derwall and Verwijmeren, 2007).

Recent research has not shown a consensus on the relationship between individual CSR measures and investor risk perception (Derwall and Verwijmeren, 2007; El Ghoul et al., 2011; Oikonomou et al., 2012). Since the aggregated ESG score combines performance in three different dimensions, it does not explain the individual impact

of the environmental, social, and governance aspects on investor risk. To shed light on the impact of the three corporate performances according to the ESG paradigm on investor risk perception, we formulate our second hypothesis as follows:

Hypothesis 2. The ESG dimensions influence investor risk perception.

- 2a: There is a relationship between corporate environmental assessment and investor risk perception.
- 2b: There is a relationship between corporate social assessment and investor risk perception.
- 2c: There is a relationship between corporate governance assessment and investor risk perception.

3 | RESEARCH DESIGN

3.1 | Sample and data

We developed a five-year longitudinal study by employing a panel of listed companies to test how ESG practices affect investors' risk perception, first through the three single impacts of ESG factors and then based on the overall ESG assessment (Table 1). We started with the 500 large-cap companies belonging to the S&P 500 stock market index, as it lists 505 common stocks that represent about 80 percent of the securities traded on the U.S. stock exchange market. According to Bouslah et al. (2013), S&P 500 firms seem to be highly visible to media and analysts, thus showing low

information asymmetry and, consequently, a more pronounced CSP-financial risk relationship.

We also defined the sample size based on the Slovin formula (Slovin, 1960) to obtain a random sample from the entire population. The Slovin formula enables the researcher to sample the population with the desired degree of accuracy as $n = N / (1 + Ne^2)$, where “n” stands for sample size, “N” stands for the entire population, and “e” is the determining error tolerance ($e = 0.05$). By applying the Slovin estimation, we obtained a random sample of 222 companies. Then, we collected the ESG scores of those companies for the last 5 years based on the ASSET4 (Thomson Reuters) ESG methodology.

3.2 | Variables

We employed ratios and ordinal scale measures for both dependent and independent variables, including ESG factors and controls (Table 1). Moreover, to achieve a wider perspective of investor risk perception, we used double measurement: on one side, we focused on the systematic risk exposure of our sampled companies to consider the market view; on the other side, we dealt with the volatility risk measure to obtain the overall investor perception.

3.2.1 | Dependent variables: Corporate risk perception

We assessed investors' expectations about the corporate risk of sampled entities based on a double perspective (Shalen, 1993;

TABLE 1 Model variables

Model variables	Description	Measure	Source
<i>Dependent variables</i>			
BETA	One-year monthly systematic risk estimation	Ratio	Morningstar©
VOLATILITY	One-year SD on daily logarithmic variation rate of stock prices	SD	Thomson Reuters©
<i>Independent variables</i>			
FULL	Overall ESG score obtained from Asset4	Value	ASSET4©
ENV	Environmental performance obtained from Asset4	Value	ASSET4©
SOC	Social performance obtained from Asset4	Value	ASSET4©
GOV	Corporate Governance performance obtained from Asset4	Value	ASSET4©
<i>Control variables</i>			
PE	Company's current share price relative to its per-share earnings	Ratio	Thomson Reuters©
LOG_TA	Logarithm of total amount of assets owned by the companies	Logarithm	Thomson Reuters©
LOG_EMP	Logarithm of full-time employees working at companies' headquarters or branches during the 2018 fiscal year	Logarithm	Thomson Reuters©
CURR_R	Current ratio measured as current total assets to current total liabilities	Ratio	Thomson Reuters©
LEV	Leverage measured as long-term debt/total assets	Ratio	Thomson Reuters©

Garfinkel, 2009): (a) A yearly systematic risk measure based on a 5-year monthly beta risk estimation, whose values were collected from the Thomson Reuters database (Fama and MacBeth, 1973; Cenesizoglu et al., 2016); and (b) Total market risk estimation through the annual *SD* of companies' daily adjusted closing prices, based on Thomson Reuters analyses.

The first measure (beta risk) is a ratio that explains the non-diversifiable investment risk over the five-year timeframe. Systematic risk depends on a company's sensitivity to changes in market returns and it accounts for the part of the risk, which is explained by how a stock's return responds to general market movements that affect the entire universe of securities (Sharpe, 1964; Oikonomou et al., 2012).

The second risk measure (volatility) represents the total risk of an investment portfolio as well as market microstructure phenomena through an overview of the price formation process and the estimation of its daily volatility by the *SD*. Total risk is affected by firm-specific characteristics and is associated with the residual risk that cannot be explained by changes in average market portfolio returns (Luo and Bhattacharya, 2009). Indeed, although market risk is typically a representation of well-diversified portfolios, some authors (Bennett and Sias, 2008) have shown that investors cannot eliminate portfolio risk through diversification.

3.2.2 | Independent variables: ESG assessment

To assess the impact of ESG components on companies' risk measures, we considered the environmental, social, and governance yearly ratings as well as the overall yearly ESG assessment issued by the ASSET4 rating agency (fiscal years 2014–2018). ASSET4 evaluates CSP based on over 178 firm-level ESG topics and by grouping them into 10 categories (Thomson Reuters, 2019). The weighted combination of such categories forms the three pillar scores and the final ESG assessment, which reflects the company's ESG performance, commitment, and effectiveness based on publicly reported information. The category scores are combined into three pillar scores: environmental, social, and corporate governance. We adopted the ASSET4 source since it has been applied in several previous studies on CSP-firm risk relationships (Cheng et al., 2014; Eccles et al., 2014; Ioannou and Serafeim, 2015).

According to the single ESG factors, the environmental score (ENV) measures companies' commitment toward reducing environmental emissions, supporting the research and development of eco-efficient products or services, and achieving efficient use of natural resources in their internal practices and processes. The social score (SOC) evaluates the commitment of firms' top management toward creating value-added products and services that meet social needs and improve firm reputation within the general community. The corporate governance score (GOV) assesses the commitment of companies' management toward following best practice corporate governance principles (Thomson Reuters, 2019).

A five-year holding period is aligned to a “buy and hold” investor approach (Mitchell and Stafford, 2000), and is consistent with the timeframe underlying the systematic risk estimation.

On this basis, we analyzed how each ESG factor affects firms' risk to highlight which component plays a driving role in long-term investment risk analysis. Accordingly, we verified the relationship between the full ESG evaluation, issued by the same agency, and corporate risk exposure, pointing out where a reliable synthesis of the three components can steer investors more easily toward a sustainable investment portfolio.

Our concern in testing the impact of all sustainability measures, from a single perspective to a full assessment, can explain the main factors affecting socially responsible investments and clarify whether investors pay attention to the deeper information of each ESG component rather than an overall ESG rating.

3.2.3 | Control variables

Based on previous studies (Sassen et al., 2016; Bouslah et al., 2013; Chang et al., 2014; Luo and Bhattacharya, 2009; Oikonomou et al., 2012), we improved the reliability of our analysis by employing five control factors that could fit the variability of risk measures. Thus, each control provided a different corporate perspective. For example, we accounted for a market-based measure using the multiple price/earning regarding financial statements, an accounting-based measure expressed by the total assets of companies, and an organization-based measure reporting the number of employees, which proxies for firm size. We also considered the effect of financial leverage on firm risk as to long-term debt over total assets. Finally, in line with Oikonomou et al. (2012), we employed the current ratio to check the impact of the firm's funding liquidity.

3.3 | Descriptive statistics

Table 2 presents the descriptive statistics for the risk measures, explanatory variables, and control variables. Regarding risk measures, the mean (median) systematic risk is 0.98 (0.99), whereas the mean (median) total risk is 0.015 (0.014). The average and median risk measures are in line with some recent studies on firm risk (Bouslah et al., 2013; Sassen et al., 2016). Looking at the ESG scores, the mean (median) scores in the sample are 64.61 (66.75) for FULL; 64.75 (67) for ENV; 65.11 (67.04) for SOC; and 64.45 (67.30) for GOV.

Table 3 shows that the individual ESG factors and the full ESG rating are significantly related to each other. Moreover, the correlation coefficients among ESG assessments and risk measures show very low relation with weak significance. Hence, we decided to test the impact of the overall assessment and the ESG sub-dimensions in separate regression models over a five-year timeframe by running a panel data analysis.

TABLE 2 Descriptive statistics

Variables	Obs.	Mean	Median	SD	Min	Max
<i>Dependent variables</i>						
BETA	1110	0.985	0.990	0.632	−1.03	6.16
VOLATILITY	1110	0.0154	0.0144	0.00525	0.00637	0.0525
<i>Independent variables</i>						
FULL	1110	64.6	66.7	15.3	13.0	94.0
ENV	1110	64.8	67.0	20.6	8.00	99.0
SOC	1110	65.1	67.0	17.6	11.0	98.0
GOV	1110	64.5	67.3	17.9	8.00	98.0
<i>Control variables</i>						
PE	1110	28.2	20.7	46.1	0.368	1145.7
LOG_TA	1110	9.87	9.81	1.31	6.09	14.5
LOG_EMP	1110	9.87	9.85	1.53	0.657	13.7
CURR_R	1110	1.80	1.71	1.15	0.170	17.5
LEV	1110	0.411	0.400	0.283	0.000	4.54

TABLE 3 Correlation matrix

Variables	1	2	3	4	5	6	7	8	9	10	11
(1) BETA	1										
(2) VOLATILITY	0.40 ^a	1									
(3) FULL	−0.03	−0.09 ^a	1								
(4) ENV	0.00	−0.08 ^a	0.87 ^a	1							
(5) SOC	−0.05	−0.09 ^a	0.85 ^a	0.71 ^a	1						
(6) GOV	−0.05	−0.03	0.65 ^a	0.35 ^a	0.34 ^a	1					
(7) PE	−0.05	0.06 ^a	−0.07 ^a	−0.03	−0.06 ^a	−0.06 ^a	1				
(8) LOG_TA	−0.01	−0.25 ^a	0.31 ^a	0.31 ^a	0.28 ^a	0.15 ^a	−0.11 ^a	1			
(9) LOG_EMP	0.08 ^a	−0.15 ^a	0.30 ^a	0.25 ^a	0.34 ^a	0.11 ^a	0.18 ^a	0.47 ^a	1		
(10) CURR_R	0.24 ^a	0.34 ^a	−0.16 ^a	−0.09 ^a	−0.14 ^a	−0.15 ^a	0.00	−0.26 ^a	−0.23 ^a	1	
(11) LEV	−0.10 ^a	−0.04	0.09 ^a	0.05	0.06 ^a	0.13 ^a	0.02	−0.01	0.01	−0.20 ^a	1

Note: This table shows the correlation coefficients for risk measures, ESG ratings, and control variables. All variables are explained in Table 1.

^aIndicates the significance at the 5% level ($p < 0.05$).

4 | ANALYSIS AND DISCUSSION OF RESULTS

To verify the impact of an ESG rating on CFP, we developed a longitudinal panel data analysis using STATA[®] statistical software. Statistically, a fixed-effects analysis is the first step forward in longitudinal studies, but it may not be the most efficient analysis model to run. Indeed, in panel data analysis, a random-effects analysis could provide a more efficient and unbiased estimation, once we can justify its application through a specific statistical test.

Before running the Hausman test (Hausman, 1978) meant to select the more appropriate model between fixed- and random-effects analyses, we carried out the Breusch and Pagan Lagrangian multiplier test to test the random effects condition. In our empirical study, this test showed the presence of random effects. Therefore, we applied the Hausman test to select a more consistent model, that

is, a fixed-effects OLS analysis, being the null hypothesis to be rejected. Except for in Model 2, we applied a random-effects panel analysis. In particular, we formulated four separate models—two for each risk measure: Model 1 estimates how an overall ESG assessment impacts systematic risk; Model 2 analyzes whether the individual ESG factors mitigate firm systematic risk; Model 3 explores the impact of the full ESG rating on corporate total market risk; Model 4 verifies whether the three ESG dimensions decrease firms' total market risk. To accomplish this goal, we developed the following equation models:

$$\text{Model 1: } \text{BETA}_{it} = \alpha_0 + \alpha_1 \text{FULL}_{it} + \alpha_2 \text{PE}_{it} + \alpha_3 \text{LOG_TA}_{it} + \alpha_4 \text{LOG_EMP}_{it} + \alpha_5 \text{CURR_R}_{it} + \alpha_6 \text{LEV}_{it} + e_{it}$$

$$\text{Model 2: } \text{BETA}_{it} = \gamma_0 + \gamma_1 \text{ENV}_{it} + \gamma_2 \text{SOC}_{it} + \gamma_3 \text{GOV}_{it} + \gamma_4 \text{PE}_{it} + \gamma_5 \text{LOG_TA}_{it} + \gamma_6 \text{LOG_EMP}_{it} + \gamma_7 \text{CURR_R}_{it} + \gamma_8 \text{LEV}_{it} + e_{it}$$

$$\text{Model 3: VOLATILITY}_{it} = \delta_0 + \delta_1 \text{FULL}_{it} + \delta_2 \text{PE}_{it} + \delta_3 \text{LOG_TA}_{it} + \delta_4 \text{LOG_EMP}_{it} + \delta_5 \text{CURR_R}_{it} + \delta_6 \text{LEV}_{it} + e_{it}$$

$$\text{Model 4: VOLATILITY}_{it} = \eta_0 + \eta_1 \text{ENV}_{it} + \eta_2 \text{SOC}_{it} + \eta_3 \text{GOV}_{it} + \eta_4 \text{PE}_{it} + \eta_5 \text{LOG_TA}_{it} + \eta_6 \text{LOG_EMP}_{it} + \eta_7 \text{CURR_R}_{it} + \eta_8 \text{LEV}_{it} + e_{it}$$

Summarizing the aforementioned analysis steps, we applied an F-test to our sample variables by choosing a fixed-effects panel analysis, aiming at identifying the nature of the estimators, that is, pooled OLS estimators or within estimators. The significance of this test shows that the panel structure has individual effects; therefore, it is better to develop a within the estimation.

Accordingly, we verified the significance of our research hypotheses through a random-effects analysis, testing whether the variance of each random intercept or slope is significantly different from zero. After testing the correlation above, we tested whether the variance of individual effects is equal to zero over the period under investigation by applying the Lagrangian multiplier test. Finally, the Hausman test clarifies which model between fixed and random effects must be chosen. The results from this test suggested developing an OLS fixed effects (within) estimation as the null hypothesis had to be rejected.

By studying the impact of the full ESG rating (Model 1) on the systematic risk measure, as given in Table 4, we found that the overall ESG rating had a positive and significant impact on beta risk estimation ($p_{\text{FULL}} < 0.05$). This, in turn, implies that investors consider that an ESG evaluation does not positively adjust the risk exposure of a listed company, as if the ESG transition was perceived as a window-dressing phenomenon before stating its systematic risk mitigation. As reported in Table 4, the positive and significant value of the overall

ESG score explains its negative effect on corporate systematic riskiness. Consequently, the higher the company's ESG score, the greater the corporate risk exposure to the S&P 500 market trend.

Moreover, concerning the impact of the ESG components (Table 4, Model 2), corporate environmental performance exerts a similar effect on the same risk measure, as environmental assessment had a positive and significant impact on the beta risk estimation ($p_{\text{ENV}} < 0.1$). This empirical evidence, aligned with the results of Model 1, is justifiable given the high and positive correlation index between the full ESG rating and the environmental score (see the correlation matrix in Table 3). Although not statistically significant, we observed that the social and governance components (i.e., "SOC" and "GOV" variables) adopted for testing H_{p2b} and H_{p2c} were negative (Table 4, Model 2), corroborating the mainstream view that the investors appraise companies' commitment to the social and governance dimensions (Margolis et al., 2007; Rennebog et al., 2008). Unfortunately, we cannot draw conclusions because they were not statistically significant, but it was interesting to notice the negative direction of the "SOC" and "GOV" items, and this could provide a foundation for future studies. This evidence is in line with previous studies that did not reveal any conclusive evidence on the relationship between individual ESG measures and investor risk perception (Wright and Ferris, 1997; Orlitzky et al., 2003; Schröder, 2007). Finally, although the variable "ENV" was statistically significant, the fact that "SOC" and "GOV" are not statistically significant questions the usefulness of separating the overall ESG assessment into its three different dimensions in future research studies.

Regarding the other riskiness versant (Table 5), that is, price volatility, we did not find any relationship between the ESG assessments and firms' total market risk (Models 3 and 4). This indicates a non-

TABLE 4 Panel data model (Beta)

Statistical approach	Fixed effects OLS	Random effects GLS
	Model 1	Model 2
Model variables	BETA - Hp. 1	BETA - Hp. 2
<i>Independent variables</i>		
FULL (Hp. 1)	0.0052504**	
ENV (Hp. 2a)		0.00292*
SOC (Hp. 2b)		-0.0029265
GOV (Hp. 2c)		-0.0002214
<i>Control variables</i>		
PE	-0.0004045	-0.0004316
LOG_TA	-0.0277098	-0.016074
LOG_EMP	0.0683079	0.0601976***
CURR_R	0.0584415**	0.1071779***
LEV	-0.1756768	-0.1431532*
F (Fisher-Snedecor)	3.64***	—
Chi ²	—	47.80***

Notes: ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

TABLE 5 Panel data model (volatility)

Statistical approach	Fixed effects OLS	Fixed effects OLS
	Model 3	Model 4
Model variables	VOLATILITY - Hp. 1	VOLATILITY - Hp. 2
<i>Independent variables</i>		
FULL (Hp. 1)	0.0000173	
ENV (Hp. 2a)		7.80e-08
SOC (Hp. 2b)		6.36e-06
GOV (Hp. 2c)		0.0000121
<i>Control variables</i>		
PE	-2.06e-08	-3.71e-08
LOG_TA	0.0007333	0.0007045
LOG_EMP	-0.0000201	-0.0000203
CURR_R	0.000397**	0.0003921**
LEV	0.0008953	0.0008376
F (Fisher-Snedecor)	6.74***	6.70***
Chi ²	—	—

Notes: ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

significant risk-reduction effect of ESG stock-picking on investment portfolios.

Therefore, from a systematic risk perspective (Table 4), we can support Hp. 1 for the overall ESG assessment and partially support Hp. 2 regarding environmental factors (Hp. 2a). However, we did not find any significant relationship between firms' total market risk and their ESG scores (Table 5).

5 | IMPLICATIONS, CONCLUSIONS, AND FUTURE DIRECTIONS

This study fits into the risk management research field, as it sheds light on how additional and non-financial information, such as an ESG assessment, affects risk perception in investors' decision-making.

Prior literature has shown limited empirical evidence on the relationship between companies' sustainability commitment and corporate risk according to the ESG paradigm. This analysis focused on a sample of 222 firms belonging to the S&P 500 stock index over 5 years (from 2014 to 2018). In our study, we adopted two different risk measures to assess the impact of ESG factors on investors' perceptions: systematic risk and total market risk estimations.

Based on our empirical results, we can state that ESG assessment tends to increase firms' risk exposure, denoting an uncertain condition among investors. Indeed, a full ESG assessment increases firms' systematic risk, corroborating studies that support the negative externalities of a corporate ESG commitment (Hill, 2001; Palazzo and Richter, 2005; Cai et al., 2012). Applying a "buy and hold" approach to our empirical study, we assume that both investors in asset allocation and companies in fundraising should adopt a mid-long-term perspective to be rewarded from sustainable asset management.

Focusing on the single ESG factors, we also found that corporate environmental performance has an upward effect on corporate systematic risk. Hence, an environmental assessment raises the corporate financial risk of companies that perform better on this ground, highlighting investor skepticism about this component.

The above discussion leads to a set of different implications at the managerial, investor, and policy levels.

5.1 | Managerial implications

Regarding the practical contribution, the implications for businesses interested in managing ESG factors and associated risks are numerous.

The impact of comprehensive ESG assessment on systematic risk may prompt managers to define a more transparency-efficient strategy. As highlighted by the discussion of the results in Section 4, higher systematic risk in a volatile market scenario could cause a company to underperform, as increasing beta risk amplifies the negative market trend. Therefore, risk managers should be able to manage this

component more efficiently through a more participatory type of communication, by involving investors in the firm's real ESG best practices. Greater transparency would make it possible to reduce the "noise" effect (Stiglitz) often associated with perceptions of skepticism regarding social and environmental initiatives, as well as reduce the risk of opportunistic behaviors linked to these types of initiatives (Capelli et al.). This, in turn, could enable companies to reduce the perception of uncertainty about their ESG performance, thereby meeting the social expectations of investors. Consequently, the complete ESG rating, as well as the environmental assessment, could increase the cost of capital of companies, since the beta coefficient is a risk factor in the estimation of the cost of capital, as in the capital asset pricing model (Fama and French, 2004).

5.2 | Implications for investors

Our observations confirm the window dressing theory (Palazzo and Richter, 2005), according to which investors can perceive the communication relating to the ESG criteria of a company that is, in reality, far from the real intentions of the management. This generates a non-negligible agency risk and leads to penalizing these companies in the stock market. In addition, the investments made toward sustainability by a company could be considered a sacrifice of profit for an unnecessary social or environmental cause, rather than an entrepreneurial opportunity that is preserved over time through an economic added value (e.g., insurance-like protection in Godfrey, 2005; Godfrey et al., 2009).

Indeed, there may be a mismatch between investor preferences and managers' behavior in terms of ESG, as represented by the theory of instrumental stakeholders (Donaldson and Preston, 1995). This would be because investors would perceive this profit sacrifice as a factor conflicting with the rational purpose of maximizing wealth.

However, the commitment of listed companies to adopt more sustainable behaviors is giving life to a new and important financial ecosystem from an institutional perspective. Specifically, stock exchanges could play a driving role in this transition toward effective sustainability, acting as guarantors and bridges between investors willing to bet on virtuous projects and responsible companies that can ensure their effective implementation.

The perspective of the results discussed in Section 4 enables us to frame a series of aspects, probably still not fully resolved, and related to the concept of sustainable finance, which would justify the reason investors perceive a "sustainable" security as being more exposed to risk.

This is probably linked to an ever-increasing amount of extra-financial information on the markets, such as sustainability reports or ESG ratings, which, however, do not seem to provide univocal information, and are not measurable based on univocally defined metrics. This poses a fundamental issue in terms of regulation to guarantee reliability to stakeholders and, consequently, provide benefit from this additional information without the social and greenwashing



phenomena. These considerations lead us to the next set of implications for policymakers.

5.3 | Policy implications

The main implications in terms of policy are connected, in part, with what has already been mentioned above in terms of the need for transparency and reduction of opportunistic risk. This makes policy action necessary to make non-financial communications more transparent for investors and, in the same way, provide companies with generalized and unambiguous indications for reporting on ESG (La Torre et al., 2021). These regulation measures would also reduce the transaction costs associated with a sustainable investment as well as the overall costs of building a portfolio, partially offsetting the opportunity cost resulting from an appropriately constrained allocation (ESG) of capital. Furthermore, a general policy orientation aimed at the financial regulation of sustainability could also govern potential agency problems between investors and companies that boast of virtuous behavior. This is in the function of a real transition toward sustainability and the desired transparency of financial markets. Finally, further considerations should be made regarding the maturity stage of the general market in terms of ESG, both from the perspectives of investors and regulations. In this sense, a general “cultural” action on these issues would be highly desirable in order to effectively support and boost the transition toward sustainability (Murphy, 2012).

However, this study is not without limitations, which we aim to address in future research.

First, the measurement error of ESG ratings was issued by only one ESG rating agency (Thomson Reuters ASSET4). Therefore, other CSP measures could be applied to the same sample to explore whether our results are confirmed by adopting different ESG assessment methodologies.

Similarly, other methodologies of a more purely qualitative nature (e.g., questionnaires, focus groups) could be applied to analyze and deepen investors' perceptions of risk. Furthermore, the analysis could be replicated in other geographical contexts, such as the European ones, in light of the new ESG taxonomy introduced in March 2021, and in consideration of the different levels of speculation present in this geographical area compared to that analyzed in this study.

Additionally, we hypothesized that corporate sustainability may reduce information asymmetry between investors and companies, but we have not tested this relationship. On this basis, we assume that additional and non-financial information has a smoothing effect on investors' perceptions of uncertainty (Chiang and Venkatesh, 1988).

Finally, based on our research topic, there may be further research to be conducted on the CSP-CFP relationship in other industrial settings, such as the SME environment. Furthermore, the ESG engagement of companies in the financial market could differ from that in the industrial market, as consumers and entrepreneurs behave according to other factors that institutional investors do not consider.

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