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Does ESG reputational risk affect the efficiency and speed of adjustment of corporate investment?

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Abstract

This study explores the relationship between environmental, social, and governance (ESG) reputational risk and investment efficiency. We provide evidence that ESG reputational risk relates to higher corporate suboptimal investment (underinvestment) and a lower speed of adjustment back to the optimal investment level. Our findings hold for parametric and non-parametric estimations of underinvestment and are robust to several techniques that address endogeneity and self-selection. Overall, our study highlights the important role of ESG reputational risk in determining corporate investment efficiency.

KEYWORDS

agency costs, capital investment, ESG reputational risk, financial constraints, overinvestment, speed of adjustment, underinvestment

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JEL CLASSIFICATION
G10, G32, G34

1 | INTRODUCTION

Firms with a long-run strategy focus on various aspects such as product differentiation, new production technology, asset reorganization, marketing competency, and diversification of organizational activities to expand their market share. In contrast, short-term-oriented firms prioritize conservative strategic investments aimed at maximizing short-term performance, often at the expense of long-term economic benefits (Langfield-Smith, 2007; Luong et al., 2017; Wang, 2023).

In frictionless markets, as in Modigliani and Miller (1958), firm investment is determined solely by its investment opportunities. However, frictions such as information asymmetry and agency problems may lead to suboptimal investment (Chen et al., 2017; Gao et al., 2021; Jiang et al., 2011; McLean et al., 2012). Underinvestment increases environmental uncertainty, restricts economic efficiency, and has a negative impact on firm performance (Fu, 2010). Firms that underinvest have an unstable strategic portfolio resulting in suboptimal value strategies. An effective implementation of a sound strategic mission requires a firm to choose its actions optimally and develop specific investment resources with the strategic intention to improve future economic growth.

A firm's long-term investment decisions and associated risks are influenced by its environmental, social, and governance (ESG) strategy (Albuquerque et al., 2019; Servaes & Tamayo, 2013). Consequently, investors' focus on and interest in ESG information has been steadily growing. In this respect prior empirical evidence shows that ESG activities impact stock market performance, corporate decisions, and corporate finance outcomes (Baker et al., 2021; Dyck et al., 2019; Hartzmark & Sussman, 2019; Lins et al., 2017). Additionally, exposure to ESG issues is associated with increased financial risk and information asymmetry (Economidou et al., 2022; Ho et al., 2021). These issues tend to favour short-term decision-making, which prioritizes managers' private benefits over shareholders' interests (Bénabou & Tirole, 2010; Cheng et al., 2014; Krüger, 2015; Siano et al., 2017). Conversely, long-term investment decisions related to ESG activities align managers' and shareholders' interests and promote "good governance" within firms.

On the basis of the notion that ESG reputational risk is associated with higher information asymmetries and agency costs (Kim et al., 2012; Lopatta et al., 2016), we posit that it is also linked to investment inefficiency. Firms facing ESG reputational risk often experience "weak governance," elevated agency costs, and difficulties aligning managers' and shareholders' interests through long-term strategies that enhance operating efficiency (Albuquerque et al., 2019; Eccles et al., 2014). Therefore, we expect ESG reputational risk to increase the cost of capital, impede external financing, and heighten long-term event and litigation risks (Servaes & Tamayo, 2013). Accordingly, we argue that ESG reputational risk is positively related to investment inefficiency (underinvestment). Furthermore, we expect that, all else being equal, firms with high ESG reputational risk, due to high agency costs, cost of capital, and mismanagement, will face greater difficulties in reverting back to their optimal investment targets, resulting in a slower speed of adjustment (SOA) compared with firms with low ESG reputational risk (Flannery & Rangan, 2006; Krüger, 2015; Siano et al., 2017).

To empirically assess the relationship between ESG reputational risk and investment efficiency we utilize a sample that consists of 1396 US listed firms between 2007 and 2019. We calculate suboptimal investment using two approaches. Our first approach, proposed by Richardson (2006), examines the degree of over- or underinvestment using the residuals from firms' investment functions. Our second approach is nonparametric, namely, data envelopment analysis. We regress our two measures of underinvestment on ESG reputational risk and a set of control variables. We find that ESG reputational risk is negatively related with firms' new investment activity and positively with firms' underinvestment. One step further, we exploit our empirical setting to estimate the SOA of high and low ESG reputational risk firms' and document that the first group has a slower SOA towards target investment.

This study contributes empirical evidence to the corporate investment literature by highlighting the crucial role of ESG issues in firms' investment efficiency and their ability to revert back to optimal levels. Unlike prior research on investment portfolio performance (Bauer et al., 2005; Renneboog et al., 2008), our study recognizes that differences in performance can be attributed, among other factors, to the relationship between ESG and investment efficiency. We focus on the interrelated themes of ESG reputational risk and corporate investment, shedding light on the importance of ESG reputational risk in facilitating efficient investment decisions. Furthermore, our analysis expands the literature by providing valuable insights into how firm characteristics can potentially explain differences in the SOA of corporate investment. We go one step further by providing evidence that ESG issues affect a firm's ability to adjust back to target levels after investment shocks.

The documentation of the relationship between ESG reputational risk and investment efficiency is timely, particularly in the context of the strategy-oriented literature. A firm's strategic orientation must consider the impact of ESG issues on corporate investment. Moreover, a firm's strategic positioning appears to influence its exposure to ESG reputational risk and its investment allocation. Therefore, our evidence is valuable for investors and practitioners, as the connection between ESG reputational risk and investment efficiency is increasingly important in shaping firm valuation and competitiveness.

The rest of this study is organized as follows. In Section 2, we set the background for the current study, and we lay out the research hypotheses. Next, we describe the data in Section 3 and methodology in Section 4. We then outline the results in Section 5. We conduct robustness tests for our results in Section 6. Lastly, the conclusions of this study are presented in Section 7.

2 | HYPOTHESES DEVELOPMENT

2.1 | ESG reputational risk, corporate new investment, and investment efficiency

In the current section, we lay out the motivation, the theoretical relationship between ESG reputational risk and investment efficiency and develop our hypotheses. In frictionless capital markets, Modigliani and Miller (1958) argue that firm-level capital investment is solely determined by investment opportunities. Nevertheless, a large body of theoretical and empirical literature opposes this view (Akerlof, 1970; Campello et al., 2010; Lopatta et al., 2016; Stulz, 1990; Zhe et al., 2021). Specifically, when market frictions such as asymmetric information are taken into consideration firm-level capital investment may be suboptimal.

Literature documents that ESG information is associated with numerous economically significant effects and investors interest (Cheng et al., 2014; Dhaliwal et al., 2011, 2012; Grewal et al., 2019; Fama, 2021; Larcker et al., 2022). In particular, Lopatta et al. (2016) find that higher ESG relates to lower information asymmetries and Kim et al. (2012) show that ESG relates to better quality financial reporting. Lin et al. (2021) document that the adjustment speed of capital structure serves as a bridge between CSR and firm performance. Andriosopoulos and Tanzila Deepty (2022) reveal that social capital, captured by CSR, is an effective hedge against risks arising from political and market competition risk. Moreover, Adeneye and Kammoun (2022) indicate that real earnings management significantly and positively affects leverage in firms with low ESG performance and across ESG pillar scores. Since ESG is important in identifying opportunities of the investments and assessing investment risks, we conjecture that ESG reputational risk aggravates information asymmetry concerns and is therefore related to investment inefficiency.

Another stream of research has highlighted that ESG reputational risk is expected to raise the cost of capital, impeding external financing. Specifically, ESG-related offenses are likely to lead to stakeholder sanctions, which raises the risk of future cash shortages (Kolbel et al., 2017). Survey-based research on UK firms' financial executives indicates that the presence of limited internal capital hampers investment (Bond & Meghir, 1994). In a similar vein, the international survey-based study by Campello et al. (2010, p. 470) shows "that the inability to borrow externally caused many firms to bypass attractive investment opportunities, with 86% of constrained U.S. CFOs saying their investment in attractive projects was restricted during the credit crisis of 2008." Caggese (2007) provides evidence that green investments affect firms' irreversibility and borrowing constraints.

Moreover, Cornell (2021) and Fafaliou et al. (2022) provide empirical evidence that ESG reputational risk raises firms' financial constraints and cost of capital. It seems that ESG reputational risk is likely to lead to underinvestment as it reduces available capital and renders access to external finance problematic. We expect this relationship to be more profound to financially constrained firms and/or firms with insufficient internal capital to fund investment opportunities.

Economidou et al. (2022) show that ESG reputational risk is a signal of firm's agency problems, which promote non-value-maximizing investment strategies and managerial self-interests on the expense of shareholders and stakeholders (Shleifer & Vishny, 1989, 1997; Cornell & Shapiro, 2021; Menla et al., 2023). Specifically, managers prioritize their own private benefits over those of the company and avoid costly investments in ESG activities. However, ESG investments can boost company's value through a number of channels, including preventing irrational decisions and solidifying market positions (Bénabou & Tirole, 2010), increase customer loyalty, and offering rewards for increased productivity to employees (Baron, 2001). In addition, by increasing their ESG materiality firms enable beneficial product market differentiation and provide insurance against event risk and litigation risks in the long run (Albuquerque et al., 2019; Eccles et al., 2014; Servaes & Tamayo, 2014). According to this perspective, well-governed businesses produce both purpose and profit (Dyck et al., 2019; Edmans, 2012; Ferrell et al., 2016), which allays investor worries about value-decreasing practices. On the contrary, ESG reputational risk signifies agency considerations and is likely to link to higher cost of capital and investment inefficiency.

On the basis of the above analysis we formulate our first set of empirically testable hypotheses:

H1: ESG reputational risk is negative related with firms' investment activity.

H2a: ESG reputational risk is positively related with underinvestment.

H2b: ESG reputational risk is positively related with investment inefficiency.

2.2 | ESG reputational risk in determining speed of investment adjustments

In addition to the impact on suboptimal investment, we propose that ESG reputational risk is also related to the firm's ability to adjust back to the target level of investment, known as the SOA. Traditional models have defined optimal investment as being determined by output and/or profits (Chenery, 1952; Fama, 1974; Koyck, 1954). However, more recent studies have considered other firm-level characteristics in determining optimal investment (Coldbeck & Ozkan, 2018; Guariglia & Yang, 2016; Richardson, 2006).

Moreover, building upon the recent body of research, we hypothesize that ESG reputational risk can influence the SOA in investments (Agoraki et al., 2023; Chasiotis et al., 2023; Dyck et al., 2019; Economidou et al., 2022; Fafaliou et al., 2022; Maxfield & Wang, 2021). This hypothesis is motivated by the positive influence of ESG reputation on corporate behaviour. Earlier studies have shown that companies with stronger ESG performance tend to promote voluntary disclosures, foster firm transparency, and are more likely to publish ESG reports alongside their sustainability initiatives (Dhaliwal et al., 2006). These firms aim to emphasize their strong performance and convey their commitment to excellence (Clarkson et al., 2008).

Prior research also documents, that low ESG reputational risk can raise the calibre of earnings. Kim et al. (2012) document that organizations with high ESG standards tend to exhibit lower usage of accruals and real earnings management practices and are more likely to have managers who prioritize ethical considerations. Consequently, these firms are more inclined to produce financial reports that are highly transparent and trustworthy. Furthermore, the improved information transparency resulting from low ESG reputational risk reduces the potential for agency costs and mitigates information asymmetry between firms and their investors (Colak et al., 2018; Öztekin & Flannery, 2012; Öztekin, 2015).

The literature further highlights the significance of low ESG reputational risk in fostering stakeholder engagement and providing competitive advantages in the product market. This competitive edge leads to reduced transaction and agency costs, encompassing monitoring, bonding, searching, and warranty expenses. Consequently, a lower level of ESG reputational risk signifies a heightened level of collaboration between businesses and their stakeholders, characterized by shared trust and support (Agoraki et al., 2023; Economidou et al., 2022). This enhanced relationship facilitates the adoption of long-term-oriented behaviours (Bénabou & Tirole, 2010; Eccles et al., 2014).

Finally, it's important to note that credit rating agencies also frequently award with superior ratings firms with low ESG risks (Attig et al., 2013; Oikonomou et al., 2014; Stellner et al., 2015). These companies' underlying asset values are less volatile, which suggests a reduced default risk and smaller estimated losses from bankruptcy. As a result, these businesses are better equipped to access outside funding sources and respond to targets more swiftly.

Overall, from all the above we expect that firms with ESG reputational risk will have higher cost of investment modification and slower speed of getting to the optimal level.

H3: ESG reputational risk relates to a slower speed of adjustment towards target investment.

3 | DATA

3.1 | Sample construction

Our sample consists of 1396 listed US companies between January 1, 2007, and December 31, 2019. We obtain firm-level financial data from Compustat database, while ESG reputational risk data are collected from the RepRisk database. We drop financial firms and utility sectors (SIC codes 6000–6999 and 4900–4999) and firms with missing information. The final sample for our baseline models is an unbalanced panel of 8450 firm-year observations. We use an unbalanced panel structure to avoid selection, survivorship bias. All variables are winsorized at the conventional 1st and 99th percentiles to reduce the protentional impact of outliers.

3.2 | Descriptive statistics

In Table 1 panel A, we document the summary statistics of our variables. In our sample the average ESG reputational risk value is 0.075 while its range lies between 0 and 0.450, which indicates that most of the firms in our sample do not have severe relevant issues. The average (median) value of Tobins'Q (*Tobin'sQ*) is 2.047 (1.613), for Leverage (*Leverage*) 19.2% (15.4%) while the average(median) period that a firm is listed is 22.49 (19) years. The cash flow volatility (CashFlowVol) and the shares held by institutional investors[1] (InstitutionalHoldings) (are on average (median) equal to 5.4% (3.95) and 70.9% (79.4%), respectively. Finally, new investment over total assets is on average (median) 25.9% and (0). In Table 2 panel B, we focus on subsamples based on the mean (median) of *ESG* reputational risk. Our findings indicate that firms which belong in the high ESG reputational risk have on average (median) less new investment, exhibit more underinvestment, and have less investment efficiency. In Table A1, we provide all variable definitions.

4 | METHODOLOGY

4.1 | ESG reputational risk measurement

We obtain ESG reputation risk data from the RepRisk, Global Business Intelligence Database, which provides the world's largest data set in monitoring a company's exposure to *ESG* issues risks. RepRisk uses a combination of advanced machine learning and highly trained analysts to quantify firms' exposure to (ESG) issues. One of the benefits of the RepRisk database is that excludes companies' ESG self-disclosers and quantifying information based on "Information by

[1]We follow Lewellen (2011) and Lewellen and Lewellen (2022) and in the rare instances where institutions appear to possess more than 100% of share outstanding, we set the maximum institutional ownership to 100%.

TABLE 1 Descriptive statistics, variable definitions are provided in Table A1, Appendix.

Panel A	*N*	Mean	Median	SD	Minimum	Maximum
CurrentRRI	8450	0.075	0	0.099	0	0.450
Investment New	8450	0.064	0.034	0.103	−0.109	0.566
DummyUnderinvestment	8450	0.261	0	0.439	0	1
DummyInefficiency	8450	0.481	0	0.5	0	1
Efficiency	8450	0.784	0.794	0.082	0.015	0.941
FreeCashFlow	8450	−0.052	−0.029	0.13	−0.992	0.117
Tobin'sQ	8450	2.047	1.613	1.413	0.561	11.643
Leverage	8450	0.213	0.192	0.184	0	0.807
FirmAge	8450	25.722	21	15.758	2	57
CashFlowVol	8450	0.048	0.035	0.045	0.004	0.285
FirmSize	8450	7.309	7.374	1.668	1.164	10.872
InstitutionalHoldings	8450	0.722	0.796	0.249	0.011	1.001
DivYield	8450	0.035	0.019	0.046	0	0.254
HHI	8450	0.113	0.075	0.119	0.026	1

Summary statistics considering high and low ESG reputational risk subsamples based on sample median.

	Low ESG reputational risk						High ESG reputational risk				
Panel B	***N***	**Mean**	**Median**	**SD**	**Minimum**	**Maximum**	**Mean**	**Median**	**SD**	**Minimum**	**Maximum**
Investment New	4225	0.259	0	0.438	0	1	0.192	0	0.440	0	1
DummyUnderinvestment	4225	0.426	0	0.495	0	1	0.540	1	0.498	0	1
DummyInefficiency	4225	0.721	0.700	0.084	0.034	0.931	0.977	0.786	0.078	0.015	0.941
Efficiency	4225	0.789	0.799	0.087	0.019	0.956	0.648	0.656	0.077	0.015	0.965

(Continues)

TABLE 1 (Continued)

Summary statistics considering high and low ESG reputational risk subsamples based on sample median.											
	Low ESG reputational risk						High ESG reputational risk				
Panel B	***N***	**Mean**	**Median**	**SD**	**Minimum**	**Maximum**	**Mean**	**Median**	**SD**	**Minimum**	**Maximum**
FreeCashFlow	4225	−0.064	−0.038	0.147	−0.992	0.117	−0.038	−0.022	0.107	−0.992	0.117
Tobin'sQ	4225	2.062	1.591	1.474	0.561	11.643	2.032	1.636	1.344	0.561	11.643
Leverage	4225	0.192	0.154	0.190	0	0.807	0.234	0.220	0.174	0	0.807
FirmAge	4225	22.49	19	13.885	2	57	29.179	24	16.871	2	57
CashFlowVol	4225	0.054	0.039	0.050	0.004	0.285	0.042	0.031	0.038	0.004	0.285
FirmSize	4225	6.633	6.705	1.404	1.164	10.872	8.031	8.08	1.624	1.625	10.872
InstitutionalHoldings	4225	0.709	0.794	0.265	0.011	1.001	0.736	0.798	0.229	0.011	1.000
DivYield	4225	0.031	0.012	0.047	0	0.254	0.039	0.027	0.045	0	0.254
HHI	4225	0.107	0.064	0.115	0.026	1	0.118	0.086	0.123	0.026	1

Abbreviation: ESG, environmental, social, and governance.

TABLE 2 Impact of environmental, social, and governance (ESG) reputational risk on firms' external financing.

This table reports the estimates regarding the impact of ESG reputational risk on firms' external financing, captured by Whited and Wu (SA), Kaplan and Zingales (KZ), and Hadlock and Pierce (WW) measures. All estimations include firm and year fixed effects (FE). The standard errors are shown in parentheses below the estimated coefficients. Variable definitions are provided in Table A1. Standard errors are clustered at the firm level and presented in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
Variables	**WW**	**SA**	**KZ**
CurrentRRI	0.039*	0.031***	1.686*
	(0.020)	(0.008)	(0.963)
FreeCashFlow	−0.838***	0.002	−0.703***
	(0.032)	(0.005)	(0.253)
Tobin'sQ	−0.002	−0.001*	−0.015***
	(0.002)	(0.001)	(0.010)
Leverage	0.223***	0.001	0.979***
	(0.011)	(0.006)	(0.280)
FirmAge	−0.030***	−0.150***	−0.787***
	(0.003)	(0.008)	(0.129)
CashFlowVol	0.289***	0.065***	−0.942***
	(0.079)	(0.014)	(0.108)
FirmSize	−0.041***	−0.695***	−0.223***
	(0.002)	(0.002)	(0.084)
InstitutionalHoldings	−0.022**	−0.005	−1.052***
	(0.009)	(0.005)	(0.378)
DivYield	−0.157***	−0.023**	−0.639***
	(0.039)	(0.010)	(0.123)
HHI	−0.038***	0.097***	0.657***
	(0.010)	(0.036)	(0.103)
Constant	−0.016	−0.644***	0.701**
	(0.018)	(0.026)	(0.370)
Observations	8451	8451	8451
R^2	0.519	0.699	0.663
Year FE	YES	YES	YES
Firm FE	YES	YES	YES

external sources.[2]" In doing so, the database avoids corporate self-disclosure bias that may arise from protentional ESG management strategies which firms may follow.

We employ the RepRisk Index (*CurrentRRI*) which captures a firm's current ESG reputational risk exposure. The database quantifies firms' exposure to 28 ESG-related issues[3] and 67 ESG-related topics accounting for the credibility of sources, the severity of issues and the company ESG historical profile. The RepRisk Index (*CurrentRRI*) ranges from 0 (lowest) which corresponds to firms with no ESG reputational risks to 100 (highest) for those with severe ESG reputational risk exposure. Overall, RepRisk covers in detail ESG reputational risk exposure and provides high-quality quantified information.

4.2 | ESG reputational risk and firms' external financing

In this section we briefly introduce, the three indices (*financial constraint indexes*) we employ to capture firm's ability to raise capital from external sources. The first index (*KZ*) is Kaplan and Zingales (1997) and is constructed using Baker et al. (2002) modification which excludes Tobin's *Q* as it might be affected by stocks mispricing. The second index (*WW*) is proposed by Whited and Wu (2006) based on a structural investment model. This third measure (*SA*) comes from Hadlock and Pierce (2010) is calculated based on firm age and size and captures the firm's financial status. The higher the value of the above three indexes, the more financially constrained a firm is. In Table A1, we present the analytical form of construction for these three indexes. To estimate the impact of ESG reputational risk on firms ability to raise external capital we estimate the following equation. The model is described in Equation (1) where ESG reputational risk (*CurrentRRI*) is the variable of interest.

$$Financial\ \ constraint\ \ indexes_{it} = b_o + b_1 CurrentRRI_{it} + b_3 Z_{it} + y_t + f_i + \varepsilon_{it}. \quad (1)$$

4.3 | Modeling investment adjustments

In this section we follow Richardson (2006)[4] to calculate annual firms' investment expenditures for new projects (I_{New}), which is defined as the difference between total capital expenditures

[2]RePrisk database verifies ESG reputational risk from a pool of various external sources and inspects them formed on severity, reach, and novelty. Afterwards, the database corroborates the occurrences for quality control applying detailed research that ensures the reliability and validity of the data by revealing information for all the companies that are exposed to scandals based on ESG issues. The severity of a company's issues is recognized by the consequences of the risk exposure, the extent of the impact, and the purpose for the exposure. It can be categorized as low, severe, and high severity. Reach of the universal sources (preclassified) as limited reach (communal public information), medium reach (national and regional public information), and high reach (international public information). The novelty of the issues reviews the times a firm has been exposed to a specific ESG reputational risk.

[3]RePrisk database identifies ESG reputational risk by examining the following issues: the environmental issues (*E*) that incorporate data for the environment's pollution and its impact on the ecosystem; the social issues (S) that present data for misconducts on human interactions on the firm's stakeholders; the governance issues (*G*) that integrate data for the managing of firm's organizational culture. The UN Global Compact Principles and the SASB Materiality Map present the 28 RepRisk ESG Issues and are available at: https://www.reprisk.com

[4]A number of subsequent studies investigated the impact of overinvestment/underinvestment on firm performance and stock performance (Fu, 2010; Liu & Bredin, 2010).

and acquisitions and sale of property, plant, and equipment.[5] We use a dynamic panel to model the SOA for firms which deviate from the target level of investment due to agency costs and asymmetrical information issues. Equation (2) defines the econometric specification we use.

$$I_{\text{New } i,t} - I_{\text{New } i,t-1} = \lambda(\hat{I}_{\text{New } i,t} - I_{\text{New } i,t-1}) + \varepsilon_{it}. \tag{2}$$

The *SOA* is defined as λ and is the difference between the target investment, $\hat{I}_{\text{New } i,t}$ and the lagged investment ($I_{\text{New } i,t-1}$). A value of λ is equal to zero implies no adjustment while a value of λ equal to one indicates an instantaneous response to deviations from the target investment. To model target investment we use a rich set of controls (X) including firm (f_i) and year (y_t) fixed effects as described in Equation (3).

$$\hat{I}_{\text{New } i,t} = \beta X_{i,t} + y_t + f_i + \varepsilon_{i,t}. \tag{3}$$

Combining the Equations (2) and (3), leading to Equation (4)

$$I_{\text{New } i,t} = (1-\lambda) I_{\text{New } i,t-1} + \lambda\beta X_{i,t} + y_t + f_i + \varepsilon_{i,t}. \tag{4}$$

In Equation (4) we set α equal to $1-\lambda$ and γ equal to $\lambda\beta$ and we reach Equation (5):

$$\mathrm{I}_{\text{New } i,t} = \alpha \mathrm{I}_{\text{New } i,t-1} + \gamma X_{i,t} + y_t + f_i + \varepsilon_{i,t}. \tag{5}$$

We assume that both the SOA λ and the effect of firm-specific characteristics on target investment β are constant time-invariant. Following Drobetz et al. (2013) we apply a sensitive regime-switching partial adjustment model that captures the variation of adjustment speed and the relative firm-specific factors related to target investment over two different regimes as described in Equations (6) and (7).

$$\text{Regime } A: \quad I^A_{\text{New } i,t} = \alpha_1 I^A_{\text{New } i,t-1} + \gamma_1 X^A_{i,t} + y_{1t} + f_{1i} + \varepsilon^A_{i,t}, \tag{6}$$

$$\text{Regime } B: \quad I^B_{\text{New } i,t} = \alpha_2 I^B_{\text{New } i,t-1} + \gamma_2 X^B_{i,t} + y_{2t} + f_{2i} + \varepsilon^B_{i,t}, \tag{7}$$

where (A) B stands for the regime where the firm lies (above) below its optimal investment. Combining Equations (6) and (7) we reach (Equation 8) which is a regime-switching partial adjustment model with D_A and D_B the two regimes which take the value of one if firm i is in the respective regime at time t and zero otherwise.

$$\mathrm{I}_{\text{New } i,t} = D_A(\alpha_1 \mathrm{I}_{\text{New } i,t-1} + \gamma_1 X_{i,t} + y_t + f_i + \varepsilon_{i,t}) + D_B(\alpha_2 \mathrm{I}_{\text{New } i,t-1} + \gamma_2 X_{i,t} + y_t + f_i + \varepsilon_{i,t}). \tag{8}$$

[5]Investment expenditure to new projects, I_{New}, is equal to total investment, I_{TOTAL} (=cash paid for the purchase and construction of fixed assets, intangible assets, and other long-term assets minus net cash recovered from disposal of fixed assets, intangible assets, and other long-term assets) minus investment expenditure to maintenance, $I_{\text{MAINTENANCE}}$ (=depreciation and amortization expenses).

From Equation, (8) a simple transformation leads to Equation (9) and we accordingly estimate the following model:

$$I_{New\ i,t} = \alpha_1 I_{New\ i,t-1} + (\alpha_2 - \alpha_1) D_B I_{New\ i,t-1} + \gamma_1 X_{i,t} + (\gamma_2 - \gamma_1) D_B X_{i,t} + y_t + f_i + \varepsilon_{i,t}. \quad (9)$$

Following Elsas and Florysiak (2015) we use doubly censored Tobit—fractional dependent variables (*DPF*) estimator—to estimate Equation (9)[6] to model the fractional nature of the normal investment ratio. We include in all estimations firm and year fixed effects to capture firms unobserved and time-invariant characteristics.

4.4 | Estimating underinvestment

We estimate firms' overinvestment and underinvestment as in the study of Richardson (2006).[7] We scale the new investment (I_{New}) by total assets and taking the following model.

$$I_{New\ i,t} = \delta + \zeta I_{New\ i,t-1} + \xi X_{i,t} + y_t + f_i + \varepsilon_{i,t}. \quad (10)$$

We include in the control set X firm-level characteristics, namely, free cash flows, leverage, returns, firm size, growth opportunities, and firm age. We proxy, firms' growth opportunities by Tobin's Q which is defined as the share of the market value to the book value of assets; firms age (*FirmAge*) is the total time that a firm is listed in the market while size (*FirmSize*) is the natural logarithm of total assets. Leverage (*Leverage*) is defined as firms' total liabilities over its total assets; Returns (*Returns*) are the stock market returns for the year before the firm's investment year and FreeCashFlow is calculated according to the accounting based framework of Richardson (2006).

As in Richardson (2006) we use the residuals of Equation (10) to capture the deviation from the target investment. Specifically, if residuals are negative there is underinvestment while positive values indicate overinvestment.

4.5 | Estimating the effect of ESG reputational risk on firms' propensity for underinvestment

To estimate the probability a firm to underinvest due to ESG reputational risk we apply a probit model. The dependent variable is a dummy that takes the value of one if a firm underinvests and the value of zero otherwise. The model is described in Equation (11) where ESG reputational risk (*CurrentRRI*) is the variable of interest.

$$Prob(Underinvestment) = b_o + b_1 CurrentRRI_{it} + b_3 Z_{it} + y_t + f_{i+}\varepsilon_{it}. \quad (11)$$

[6]Elsas and Florysiak (2015) propose a doubly censored (bounded between zero and one) Tobit estimator for unbalanced panel data, which is unbiased in the presence of fractional dependent variables and accounts for unobserved heterogeneity. Other econometric techniques (e.g., ordinary least square, instrumental variable, generalized method of moments) fail to adequately address the fractional nature of the dependent variable (i.e., from being bounded between zero and one) leading to biased estimates.

[7]A number of subsequent studies investigated the impact of overinvestment/underinvestment on firm performance and stock performance (Fu, 2010; Liu & Bredin, 2010).

We examine the impact of ESG reputational risk on firms' underinvestment and include in the regression a rich set of control variables. Specifically, we control for a firm's growth opportunities by including Tobin's *Q* (*TobinsQ*), for the years that a firm is listed in the stock market by including it's age (*FirmAge*), for its size and leverage by adding firm size (*FirmSize*) and leverage (*Leverage*). The study controls for a firm's free cash flows (*FreeCashFlows*) and stock returns (*Returns*). It also includes the regression firm and year fixed effects. Overall, all the above variables included in the model aimed to capture firm-specific characteristics that protentional could affect firm investment ability.

4.6 | Entropy-balanced regressions and propensity score matching

To further secure our findings we use entropy-balancing regressions to calibrate the unit weights in our model (Hainmueller, 2012). In doing so, we equalize the distribution of moments between the firms which belong to the subsamples with ESG reputational risk above and below the sample average. This methodology improves the covariate balance and adjusts for possible inequalities in the covariance distributions. In addition, to further address protentional endogeneity concerns we apply the propensity score matching technique. In doing so, we match firms with similar characteristics based on the control set. Specifically, we use a dummy variable (*Dummy_RRI*) that equals 1 when ESG reputational risk is higher than the sample average, and 0 otherwise. Then, we compare firms with similar characteristics in terms of the control variables that only differ in their levels of ESG reputational risk, so any observed differences in firms' investment are due to their level of exposure to ESG reputational risk.

4.7 | Instrumental variable analysis

In this section we follow an instrumental variable approach (two-stage least squares [2SLS]) to check that our baseline findings do not suffer from endogeneity which may be caused by reverse causality, omitted variables, and measurement error. Our first instrument is the country sector average ESG reputational risk (three-digit SIC code). We choose these instruments motivated by the literature (e.g., El Ghoul et al., 2011; Hasan et al., 2021) which argues that same industry firms are more likely to face similar ESG risks. Second, based on Lewbel (2012) we construct heteroskedasticity-based instruments. The former methodology can be used in the absence or as a supplement to external instruments, to address the problem of endogenous regressors by identifying the structural parameters. To achieve identification the regressors must be uncorrelated with the product of heteroskedastic errors, which is caused in models with error correlations due to unobserved common factors. To construct these instruments, we use the control variables of the model and utilize heterogeneity in the error term of the first-stage regression.

The first stage of this method regresses the instruments and the control variables on the firm's ESG reputational risk, which is the endogenous variable. The second stage regresses the dependent variables of our baseline models (Investment, firm efficiency, underinvestment, and inefficiency) on the control variables including the predicted residuals of the first stage. Equations (12) and (13) describe the first and second stages of our 2SLS approach:

$$ESG_{i,t} = a_0 + a_1 Instrument_{i,t} + a_2 Z_{i,t} + firm_i + year_t + u_{t,t}, \quad (12)$$

$$Dependent \quad variable_{i,t} = a_0 + a_1 Predicted(ESG)_{i,t} + a_2 Z_{i,t} + firm_i + year_t + u_{t,t}, \quad (13)$$

where dependent variables are new investment, firm efficiency, underinvestment, and inefficiency, depending on the estimated model.

5 | EMPIRICAL ANALYSIS

In this section, we initially examine the association between firms' ESG reputational risk and firms' new investment. Then, we delve deeper and investigate the impact of ESG reputational risk on firms' investment efficiency, and on investment SOA to target investment.

5.1 | Impact of ESG reputational risk on firms' external financing

To account for the association between ESG reputational risk (*Current RRI*) and firms external financing we estimate Equation (1). In column (1) we use high dimensional fixed effects (HDFE), while the response variable is KZ index. Moreover, in columns (2) and (3) the outcome variable is WW and SA indexes, respectively. In all estimates we include firm and year fixed effects. Table 1 documents that the coefficients across all specifications are positive and statistically significant at conventional levels. In particular, in column (1) the coefficient of (*Current RRI*) is 0.039 and statistically significant at the 10% level, while in columns (2) and (3) is 0.031 and statistically significant at the 1% level and 1.68 and statistically significant at the 10% level, respectively. These findings suggest that firms with ESG reputational risk face difficulties to raise external capital.

5.2 | Impact of ESG reputational risk on firms' new investment

In Table 3 we document our estimates considering the association between ESG reputational risk[8] (*Current RRI*) and firms' new investment (I_{New}) which is a direct test of our hypothesis H1. In column (1) we initially estimate our model using the OLS estimator. Moreover, in column (2) we apply a high-dimensional fixed effect estimator (HDFE) accounting for unobserved firm-specific heterogeneity. Finally, in column (3) we estimate our model using entropy-balanced scores and weight the HDFE adjusting for possible inequalities in the covariance distributions. Our findings across all specifications suggest that the ESG reputational risk has a negative and statistically significant impact at the 1% level on firms' new investments. On the basis of the above analysis, hypothesis H1 is not rejected. The findings demonstrate a negative association between ESG reputational risk and firms' new investment activity while the estimated coefficients for free cash flow, age, and dividend yield are significant and have a negative sign. It seems that firms' new investment activity decreases with the aforementioned factors. Control variables' direction and significance are generally as expected based on the literature. Our findings are robust to the following alternative design choices including high-dimensional fixed effect, entropy-balanced scores, and weight of the high-dimensional fixed effects.

[8]In Table A3 for robustness purposes, we re-estimate our model using (*PeakRRI*).

TABLE 3 Impact of ESG reputational risk on firms' new investment.

This table reports the estimates regarding the relationship between ESG reputational risk and firms' new investment (*Investment new*). In column (1) we estimate our model using the polled OLS estimator while in column (2) we apply a high-dimensional fixed effect estimator (HDFE). In column (3) weight the estimated HDFE adjusting for possible inequalities in the covariance distributions. Variable definitions are provided in Table A1. All estimations include firm and year fixed effects. Standard errors are clustered at the firm level and presented in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Variables	(1) Investment new (OLS)	(2) Investment new (HDFE)	(3) Investment new (HDFE—entropy balanced)
CurrentRRI	−0.067***	−0.046***	−0.054***
	(0.013)	(0.014)	(0.015)
FreeCashFlow	−0.290***	−0.235***	−0.203***
	(0.022)	(0.025)	(0.024)
Tobin'sQ	0.016***	0.014***	0.014***
	(0.001)	(0.001)	(0.002)
Leverage	0.000	0.020**	0.026**
	(0.009)	(0.010)	(0.011)
FirmAge	−0.014***	−0.012***	−0.006**
	(0.002)	(0.002)	(0.003)
CashFlowVol	0.198***	0.128***	0.144**
	(0.044)	(0.045)	(0.059)
FirmSize	0.008***	0.004***	0.005***
	(0.001)	(0.001)	(0.002)
InstitutionalHoldings	0.033***	0.029***	0.025***
	(0.007)	(0.007)	(0.008)
DivYield	−0.066***	−0.101***	−0.117***
	(0.025)	(0.024)	(0.031)
HHI	−0.080***	0.025*	0.025
	(0.015)	(0.015)	(0.016)
Constant	−0.044***	−0.025**	−0.032**
	(0.011)	(0.010)	(0.014)
Observations	8449	8421	8421
R^2	0.241	0.310	0.284
Year FE	YES	YES	YES
Firm FE	YES	YES	YES

Abbreviations: ESG, environmental, social, and governance; FE, fixed effects; OLS, ordinary least squares.

5.3 | ESG reputational risk and firms' new investment activity under financial constraints.

In this section, we investigate the relationship between ESG reputational risk and new investment activity when firms are financial constrained as an additional test to support H1. If H1 holds, we anticipate that ESG reputational risk will have a negative effect on firm's new investment activity, and this effect would be particularly strong for businesses with limited access to external financing. Consequently, we add two extra variables to $CurrentRRI \times WW$ and $CurrentRRI \times KZ$. Table 4 shows that the coefficients of the interaction terms are negative and statistically significant at the conventional levels across all specifications which indicate that the negative relationship between ESG reputational risk and firms' new investment activity is amplified in the presence of financial constraints. Overall, our research shows that firms with higher external financial restrictions are more likely to experience the negative effects of ESG reputational risk on their new investment activity. An explanation for this finding may be that these firms focus to improve their competitiveness, by increasing their ESG materiality at the expense of the potential investment.

5.4 | Impact of ESG reputational risk on firms' propensity for underinvestment

In Table 5 we estimate Equation (11) to explore the association between ESG reputational risk and firms misinvestment which is a direct test of our hypothesis H2a. The rationale behind this notion is that firms with high ESG reputational risk face higher informational asymmetry, agency costs, and increased financial difficulties since investors trust them less. In column (1) we estimate our model using the probit estimator. Moreover, in column (2) we apply a weighted probit model using entropy balance to adjust for possible inequalities in the covariance distributions while in column (3) we weight our model with propensity matching score. In all the regressions we include year and firm fixed effects. As predicted, the impact of ESG reputational risk on firms' underinvestment is positive and statistically significant at the conventional levels ranging from (0.351) to (0.626). On the basis of the above analysis, hypothesis H2a is not rejected. The findings document that firms with ESG reputational risk have a higher propensity for underinvestment. Control variables' direction and significance are generally as expected based on the literature. our results are robust to the following alternative design choices including weighting with entropy-balanced and propensity matching scores.

5.5 | Impact of ESG reputational risk on firms' investment efficiency

In this section, we turn our attention to how ESG reputational risk impacts on firms' investment efficiency. In Table 6 we present the estimates of Equations (10) and (11) using as dependent variables the firm's investment efficiency and a dummy that takes the value of one if a firm invests inefficiently, and otherwise 0. We employ several estimators, which are designed to explore whether there is a negative association between ESG reputational risk and investment efficiency. First, in column (1) we apply the OLS estimator, while in column (2) we account for possible unobserved firm-specific heterogeneity using the HDFE. Finally, in

TABLE 4 Impact of ESG reputational risk on firms' new investment—The role of financial constraints.

This table reports the estimates regarding the relationship between ESG reputational risk and firms' new investment in the presence of financial constraints. In columns (1)–(3) and (4)–(6), we proxy financial constraints using Kaplan and Zingales (1997) and Whited and Wu (2006) indexes, respectively. Variable definitions are provided in Table A1, Appendix. Standard errors are clustered at the firm level and presented in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Variables	(1) Investment new HDFE	(2) Investment new HDFE with entropy matching	(3) Investment new HDFE with propensity matching	(4) Investment new HDFE	(5) Investment new HDFE with entropy matching	(6) Investment new HDFE with propensity matching
CurrentRRI	−0.074***	−0.045*	−0.039	−0.053***	−0.067***	−0.053***
	(0.023)	(0.025)	(0.025)	(0.011)	(0.014)	(0.011)
WW	0.018	0.008	0.004			
	(0.008)	(0.008)	(0.010)			
CurrentRRI × *WW*	−0.064**	−0.086*	−0.077**			
	(0.031)	(0.048)	(0.036)			
KZ				0.000**	0.000***	0.000*
				(0.000)	(0.000)	(0.000)
CurrentRRI × *KZ*				−0.010***	−0.011***	−0.021**
				(0.001)	(0.001)	(0.010)
FreeCashFlow	−0.217***	−0.146***	−0.138***	−0.234***	−0.206***	−0.184***
	(0.017)	(0.021)	(0.022)	(0.015)	(0.017)	(0.017)
Tobin'sQ	0.014***	0.010***	0.010***	0.014***	0.015***	0.014***
	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Leverage	0.014*	0.085***	0.067***	0.017**	0.023***	0.031***
	(0.007)	(0.017)	(0.015)	(0.007)	(0.009)	(0.008)

(Continues)

TABLE 4 (Continued)

Variables	(1) Investment new HDFE	(2) Investment new HDFE with entropy matching	(3) Investment new HDFE with propensity matching	(4) Investment new HDFE	(5) Investment new HDFE with entropy matching	(6) Investment new HDFE with propensity matching
FirmAge	−0.011***	−0.094***	−0.103***	−0.011***	−0.006***	−0.009***
	(0.002)	(0.011)	(0.012)	(0.002)	(0.002)	(0.002)
CashFlowVol	0.126***	0.065	0.057	0.135***	0.147***	0.190***
	(0.034)	(0.055)	(0.055)	(0.035)	(0.047)	(0.039)
FirmSize	0.005***	0.040***	0.045***	0.005***	0.005***	0.004***
	(0.001)	(0.005)	(0.005)	(0.001)	(0.001)	(0.001)
InstitutionalHoldings	0.031***	0.027**	0.038***	0.029***	0.024***	0.025***
	(0.005)	(0.013)	(0.013)	(0.005)	(0.006)	(0.005)
DivYield	−0.098***	−0.083***	−0.079***	−0.092***	−0.107***	−0.112***
	(0.021)	(0.026)	(0.026)	(0.021)	(0.029)	(0.024)
HHI	0.027**	0.080*	0.039	0.027**	0.023*	0.012
	(0.012)	(0.042)	(0.033)	(0.012)	(0.014)	(0.010)
Total effect CurrentRRI	0.093***	0.068***	0.041***	0.055***	0.083***	0.084***
	(0.031)	(0.024)	(0.014)	(0.019)	(0.028)	(0.030)
Observations	8421	8421	8421	8421	8421	8421
R^2	0.296	0.560	0.538	0.313	0.297	0.280
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES

Abbreviations: ESG, environmental, social, and governance; FE, fixed effects; HDFE, high-dimensional fixed effect estimator.

TABLE 5 Impact of ESG reputational risk on firms' propensity for underinvestment.

This table reports the estimates regarding the relationship between ESG reputational risk and firms' underinvestment. In column (1) we employ probit regression, while in columns (2) and (3) we apply probit, probit with entropy, and propensity matching. Variable definitions are provided in Table A1. All estimations include firm and year fixed effects. Firm-level clustered, robust standard errors are in parentheses. ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

	(1)	(2)	(3)
	Underinvestment	Underinvestment	Underinvestment
Variables	Probit	Probit with entropy-balanced weights	Probit with propensity matching weights
CurrentRRI	0.351*	0.626**	0.422*
	(0.199)	(0.254)	(0.224)
FreeCashFlow	1.641***	1.932***	2.082***
	(0.188)	(0.251)	(0.261)
Tobin'sQ	−0.336***	−0.295***	−0.320***
	(0.019)	(0.029)	(0.024)
Leverage	−0.483***	−0.486***	−0.580***
	(0.105)	(0.132)	(0.128)
FirmAge	−0.070***	−0.110***	−0.049
	(0.027)	(0.033)	(0.032)
CashFlowVol	0.408	−0.075	−0.717
	(0.466)	(0.679)	(0.625)
FirmSize	0.004	0.004	0.013
	(0.015)	(0.024)	(0.019)
InstitutionalHoldings	0.019	0.075	−0.045
	(0.076)	(0.098)	(0.093)
DivYield	−0.005	−0.155	−0.373
	(0.372)	(0.497)	(0.454)
HHI	0.400**	0.231	0.569***
	(0.168)	(0.208)	(0.205)
Observations	8248	8248	8220
Year FE	YES	YES	YES
Firm FE	YES	YES	YES

Abbreviations: ESG, environmental, social, and governance; FE, fixed effects.

column (3) we re-estimate our model using entropy-balanced scores and weight the HDFE adjusting for possible inequalities in the covariance distributions. In all the former specifications the dependent variable captures firms' investment efficiency. Our results from all the different estimation methods indicate that ESG reputational risk is negatively associated with investment efficiency, and these findings are statistically significant at conventional levels.

TABLE 6 Impact of ESG reputational risk on firms' investment efficiency.

This table reports the estimates regarding the relationship between ESG reputational risk and firms' investment efficiency (Equations 10 and 11), using as dependent variables the firm's investment *Efficiency* and *Inefficiency* which is a dummy that takes the value of 1 if a firm invests inefficient, otherwise 0. In column (1) we apply the OLS estimator, while in columns (2) and (3) we employ high-dimensional fixed effect estimator (HDFE) and entropy-balanced HDFE adjusting for possible inequalities in the covariance distributions, respectively. In columns (4)–(6) we apply probit, probit with entropy, and propensity matching to explain firms' inefficiency. Variable definitions are provided in Table A1. All estimations include firm and year fixed effects. Firm-level clustered, robust standard errors are in parentheses. ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

Variables	(1) Efficiency OLS	(2) Efficiency HDFE	(3) Efficiency HDFE Entropy Matching	(4) Inefficiency PROBIT	(5) Inefficiency PROBIT Entropy Matching	(6) Inefficiency PROBIT Propensity Matching
CurrentRRI	−0.064***	−0.026*	−0.040***	0.221	0.708***	0.885***
	(0.015)	(0.014)	(0.013)	(0.191)	(0.262)	(0.216)
FreeCashFlow	0.279***	0.275***	0.280***	−3.591***	−3.593***	−3.510***
	(0.025)	(0.024)	(0.027)	(0.168)	(0.231)	(0.214)
Tobin'sQ	−0.000	−0.002	−0.002	−0.121***	−0.123***	−0.117***
	(0.001)	(0.002)	(0.002)	(0.013)	(0.016)	(0.016)
Leverage	−0.017**	−0.005	−0.010	0.928***	0.944***	1.140***
	(0.008)	(0.008)	(0.008)	(0.096)	(0.145)	(0.117)
FirmAge	0.002	0.003	0.000	0.116***	0.224***	0.133***
	(0.002)	(0.002)	(0.002)	(0.025)	(0.038)	(0.031)
CashFlowVol	0.135**	0.098*	0.101*	−4.000***	−4.822***	−5.346***
	(0.061)	(0.058)	(0.054)	(0.450)	(0.583)	(0.562)
FirmSize	−0.005***	−0.006***	−0.004***	0.197***	0.099***	0.089***
	(0.001)	(0.001)	(0.001)	(0.014)	(0.026)	(0.019)

TABLE 6 (Continued)

Variables	(1) Efficiency OLS	(2) Efficiency HDFE	(3) Efficiency HDFE Entropy Matching	(4) Inefficiency PROBIT	(5) Inefficiency PROBIT Entropy Matching	(6) Inefficiency PROBIT Propensity Matching
InstitutionalHoldings	0.043***	0.015**	0.011	−0.300***	−0.336**	−0.367***
	(0.009)	(0.007)	(0.007)	(0.070)	(0.140)	(0.088)
DivYield	0.011	−0.010	−0.026	−0.553	0.145	−0.269
	(0.018)	(0.016)	(0.017)	(0.345)	(0.465)	(0.424)
HHI	−0.074***	−0.032***	−0.020	1.805***	2.227***	1.695***
	(0.012)	(0.012)	(0.012)	(0.183)	(0.304)	(0.224)
Constant	0.809***	0.828***	0.830***	−2.051***	−2.049***	−1.041***
	(0.017)	(0.013)	(0.014)	(0.277)	(0.364)	(0.333)
Observations	8449	8421	8421	8449	8449	8421
R^2	0.208	0.318	0.325			
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES

Abbreviations: ESG, environmental, social, and governance; FE, fixed effects; OLS, ordinary least squares.

Columns (4)–(6) document our findings considering the impact of ESG reputational risk on firms inefficient. Consequently, hypothesis H2b is not rejected. Our results are robust to these additional tests and the coefficients are positive and statistically significant at the conventional levels. A possible explanation for these findings is that firms with ESG reputational risk due to agency and information asymmetry problems, have a higher propensity for suboptimal investment, (Jensen and Meckling, 1976).

5.6 | Impact of ESG reputational risk on firms' investment SOA

In this section we empirically test the impact of ESG reputational risk on firms' ability to adjust and correct the potential deviations from the target investment. In Table 7, panel A we provide the estimates of Equation (9). In column (1) we consider all firms in the sample while in columns (2) and (3) we estimate our model for firms with ESG reputational risk above the sample median and below, respectively. The coefficient of lagged new investment expenditure ($I_{\text{New } t-1}$) is positive and statistically significant at a 1% level across all specifications as well as most of the target investment determinants as shown by the relevant interaction terms. Moreover, our estimates indicate that the positive effect of lagged new investment expenditure ($I_{\text{New } t-1}$) on new investment becomes stronger for the subsample of high ESG reputational risk firms.

In Table 7, panel B our findings show significant asymmetries in the SOA between the two groups of high and low ESG reputational risk. We calculate the SOA as the difference of $1-\lambda$, where λ is the estimated coefficient of the lagged new investment expenditure ($I_{\text{New } t-1}$). Specifically in column (1) the SOA is equal to 91.3% (0.913% = 1 − 0.087), while in columns (2) and (3) similarly is equal to 88.9% and 92.8%. These results have also economic significance by showing that firms with low ESG reputational risk are more investment efficient comparing with those belonging to the high ESG reputational risk group and correct the deviations from target investment with faster adjustment speed. That is, ESG reputational risk affects not only the investment efficiency but also the ability of the firm to adjust back to target after investment shocks.

According to these findings our third hypothesis (H3) is not rejected. It seems that firms with higher levels of ESG reputational risk face more difficulties to revert to target investment, and thus exhibit slower SOA towards the optimal investment. Our results considering the SOA estimates, using a subsample of firms with high or low ESG reputational risk, are also meaningful. We argue that ignoring the differences in the SOA across firms with different strategies regarding environmental, social, and governance issues is likely to produce misleading conclusions.

6 | ADDRESSING PROTENTIONAL ENDOGENEITY AND SELF-SELECTION

6.1 | Instrumental variables estimations (2SLS)

In Table 8, we document the 2SLS and the panel instrumental variable (IV)-probit with random effects estimations. In column (1) we provide the estimates of the first stage where the dependent variable is ESG reputational and the regressors are the country sector average ESG

TABLE 7 Impact of ESG reputational risk on firms' investment speed of adjustment (SOA).

This table reports estimates regarding the relationship between ESG reputational risk and firms' investment SOA. Panel A presents high-dimensional fixed effects (firm, year) estimations of the relationship between ESG Reputational Risk and firms' new investment. In column (1) we consider that total sample while in columns (2) and (3) we split our sample based on the median and focus on subsamples with high and low ESG reputational Risk, respectively. Firms' new investment is calculated following Richardson (2006). Panel B documents the estimates of the relationship between ESG reputational risk and SOA of firm's investment using high-dimensional fixed effects (firm, year). SOA is calculated at the firm level. In column (1) we consider the total sample while in columns (2) and (3) we focus on high and low ESG reputational risk subsamples. Where D_B stands for the regime where the firm lies below its optimal investment. Variable definitions are provided in Table A1. All estimates include firm and year fixed effects. Firm-level clustered, robust standard errors are in parentheses. ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

Variables	**(1)** **Investment new**	**(4)** **Investment new**	**(7)** **Investment new**
Panel A	**Total sample**	**High *ESG* *Reputational risk***	**Low *ESG* *Reputational risk***
$I_{\text{New } t-1}$	0.087***	0.111***	0.072***
	(0.009)	(0.023)	(0.011)
FreeCashFlow	−0.361***	−0.355***	−0.393***
	(0.015)	(0.033)	(0.022)
Tobin's Q	0.016***	0.018***	0.014***
	(0.001)	(0.003)	(0.002)
Leverage	0.076***	0.067***	0.080***
	(0.013)	(0.023)	(0.021)
FirmAge	−0.014***	−0.017***	−0.012***
	(0.002)	(0.001)	(0.032)
FirmSize	0.012***	0.019***	0.018***
	(0.003)	(0.006)	(0.004)
Returns	−0.026***	−0.019***	−0.025***
	(0.003)	(0.005)	(0.003)
$FreeCashFlow \times D_B$	0.464***	0.488***	0.436***
	(0.016)	(0.035)	(0.023)
$FirmAge \times D_B$	0.001***	0.001***	0.001**
	(0.000)	(0.000)	(0.000)
$I_{\text{New } t-1} \times \text{D}_B$	1.049***	1.088***	0.969***
	(0.039)	(0.071)	(0.055)
$Tobin'sQ \times D_B$	−0.021***	−0.023***	−0.016***
	(0.002)	(0.003)	(0.002)
$Leverage \times D_B$	−0.084***	−0.054**	−0.085***
	(0.013)	(0.021)	(0.020)

(Continues)

TABLE 7 (Continued)

Variables	(1) Investment new	(4) Investment new	(7) Investment new
Panel A	**Total sample**	**High *ESG* *Reputational risk***	**Low *ESG* *Reputational risk***
$FirmSize \times D_B$	−0.013***	−0.012***	−0.015***
	(0.001)	(0.001)	(0.001)
$Returns \times D_B$	0.022***	0.014**	0.021***
	(0.003)	(0.007)	(0.004)
Constant	0.027	0.002	0.064**
	(0.017)	(0.021)	(0.028)
Observations	8451	4225	4225
Year FE	YES	YES	YES
Firm FE	YES	YES	YES
Panel B	**(1) All firms**	**(2) High *ESG* *Reputational risk***	**(3) Low *ESG* *Reputational risk***
SOA (below target investment) (%)	91.3	88.9	92.8
Observations	8451	4225	4225

Abbreviations: ESG, environmental, social, and governance; FE, fixed effects.

reputational risk and the heteroscedasticity instruments based on the control variables. In addition, columns (2) and (3) provide the estimates of the 2SLS procedure considering the impact of ESG reputational risk on firms' new investment and efficiency, while in columns (4) and (5) we apply IV-probit to estimate its impact on underinvestment and investment inefficient. Our findings are in line with those of the baseline estimations and support that firms with ESG reputational risk have negative and statistically significant impact on firms' new investment and investment efficiency by 14% and 8%, respectively. Moreover, we reveal that firms with ESG reputational risk have an increased propensity for underinvestment and investment inefficiency. To test the exogeneity of the instrument we use the Wald test which rejects the null hypothesis of no exogeneity. To evaluate the validity of the instrument and check if the number of instruments is adequate with the number of endogenous variables, we use Kleibergen and Pap underidentification (Lagrange multiplier statistic) test and p value lower than 0.05 so we reject the null hypothesis of underidentification at the 5% level. In addition, we check for potential correlation between the instruments and the residuals of the models by applying the Hansen overidentification test and take a higher p value than 0.05 so we reject the hypothesis which states that overidentifying restrictions are valid at a 5% level. Finally, we use a *weak identification test* to explore the explanatory power of our instruments. The critical values of the model are lower than the Cragg–Donald Wald F statistic so the instruments are not weak and have explanatory power. Overall, the tests show that we have conducted the 2SLS estimations in a proper way.

TABLE 8 Addressing endogeneity—Instrumental variables estimations (2SLS).

This table reports the estimates regarding the relationship between ESG reputational risk, firms' new investment, and efficiency. In column (1) we provide the estimates of the first stage where the dependent variable is ESG reputational and the regressors are the country sector average ESG reputational risk and the heteroscedasticity instruments based on the control variables. In columns (2) and (3) using 2SLS we estimate the impact of ESG reputational risk on firms' new investment and efficiency while in columns (4) and (5) we apply IV-probit to estimate its impact on underinvestment and inefficient. Variable definitions are provided in Table A1. All estimates include firm and year fixed effects and robust standard errors in parentheses. ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

	(1)	(2)	(3)	(4)	(5)
		Investment new	Firm efficiency	Underinvestment	Inefficiency
	First stage	Second stage		second stage	
Variables		IV 2SLS		IV-probit	
CurrentRRI		−0.140***	−0.080***	1.459***	0.915*
		(0.038)	(0.026)	(0.298)	(0.488)
FreeCashFlow		−0.298***	0.267***	2.369***	−3.329***
		(0.014)	(0.017)	(0.173)	(0.143)
Tobin'sQ		0.017***	0.000	0.328***	−0.129***
		(0.001)	(0.001)	(0.013)	(0.012)
Leverage		−0.010	−0.020***	−0.704***	0.846***
		(0.007)	(0.004)	(0.128)	(0.086)
FirmAge		−0.012***	0.001	−0.059*	0.127***
		(0.002)	(0.001)	(0.032)	(0.021)
CashFlowVol		0.202***	0.154***	0.066	−3.885***
		(0.035)	(0.033)	(0.485)	(0.396)
FirmSize		0.011***	−0.004***	−0.245***	0.229***
		(0.002)	(0.001)	(0.034)	(0.024)

(Continues)

TABLE 8 (Continued)

	(1)	(2)	(3)	(4)	(5)
	First stage	Investment new Second stage	Firm efficiency	Underinvestment second stage	Inefficiency
Variables		IV 2SLS		IV-probit	
InstitutionalHoldings		0.025***	0.040***	0.338***	−0.317***
		(0.005)	(0.004)	(0.102)	(0.072)
DivYield		−0.049**	0.012	1.391***	−0.620**
		(0.022)	(0.012)	(0.454)	(0.300)
HHI		−0.075***	−0.070***	0.082	1.873***
		(0.008)	(0.005)	(0.204)	(0.137)
Country sector average RRI	0.061***				
	(0.001)				
z_FreeCashFlow	−0.041***				
	(0.015)				
z_Tobin'sQ	0.004***				
	(0.001)				
z_Leverage	0.039***				
	(0.011)				
z_FirmAge	0.038***				
	(0.006)				
z_CashFlowVol	−0.013				
	(0.040)				

TABLE 8 (Continued)

Variables	(1) First stage	(2) Investment new Second stage IV 2SLS	(3) Firm efficiency	(4) Underinvestment second stage IV-probit	(5) Inefficiency
z_FirmSize	0.029***				
	(0.003)				
z_InstitutionalHoldings	−0.062***				
	(0.010)				
z_DivYield	0.035				
	(0.024)				
z_HHI	−0.057*				
	(0.034)				
Observations	8421	8421	8421	8248	8421
Year FE		YES	YES	YES	YES
Firm FE		YES	YES	YES	YES

Abbreviations: 2SLS, two-stage least squares; ESG, environmental, social, and governance; FE, fixed effects; IV, instrumental variable.

6.2 | Accounting for selection bias

In this section, we employ the two-stage Heckman selection model to ensure that our results are not driven by selection bias that could violate the assumption of zero covariance between the ESG reputational risk and the random error. Our motivation stems from the fact that companies with particular traits are more likely to experience an increase in ESG reputational risk. Additionally, confounding variables may affect both ESG reputational risk, as long as, the firm's new investment and investment efficiency. In this scenario, selection bias will affect the coefficient of ESG reputation risk. In the first stage of the two-stage Heckman model, we estimate the likelihood that a firm's ESG reputational risk is higher than the sample median (High ESG Risk) using a probit regression. In the second stage, we incorporate the individual predicted probabilities from the first stage to account for potential self-selection. The following gives the selection equation:

$$DI^{*}_{i,t} = kZ_{i,t} + \varepsilon_{t,t}, \tag{14}$$

where $DI_{i,t} = \begin{cases} 1 & \text{if } High\_ESG\_Risk^{*}_{i,t}, \\ 0 & \text{if } Low\_ESG\_Risk^{*}_{i,t}. \end{cases}$

Where DI^{*}_{i} stands for a dummy latent variable that controls for the magnitude of ESG reputational risk, k is defined as a vector with the estimated coefficients, $Z_{i,t}$ is a vector which includes predictor variables of $DI_{i,t}$, and $\varepsilon_{t,t}$ is the error of the model. The first stage of the Heckman model includes the same regressors as in our baseline and in addition to account for selection bias that may affect ESG reputational risk, we add some extra variables that are called exclusion restrictions (Li & Prabhala, 2007). Following previous research (Deng et al., 2013; Dutordoir et al., 2018; Hoi et al., 2013), we use variables based on the location of firms' headquarters as exclusion restrictions.

The first exclusion restriction we use is *State Religion* as firms' ESG activity tends to be related to the degree of religiosity of the state in which a firm's headquarters are located (Angelidis & Ibrahim, 2004). Our second exclusion restriction is the *State Political Orientation* as firms with headquarters in Democratic Party states are typically more engaged in ESG activities (Rubin, 2001). There is no theoretical ground to expect a relation between these variables and firms' investment activity. The second stage of the regression includes the same explanatory variables as the OLS basic model in column (1), and additionally the inverse Mills ratio, which captures the unobservable factors which may affect both the selection and outcome.

The theory behind it is that there is less tolerance for firms with ESG reputational risk in headquarters that correspond to blue states and have a high degree of religiosity. We also add Industry Share (*Industry Share*), which is the proportion of firms in a given country's industry to all firms in the sample that are involved in that industry (Agoraki et al., 2023). Therefore, we account for any selection bias that may result from potential imbalances in the distribution of firms among industries. We build Equations (15) and (16) considering enterprises with high and low ESG reputational risk, respectively.

$$E\left[New\ \ Investment \mid DI_{i,t} = 1\right] = \beta' X + \delta + E\left[e|DI_{i,t} = 1\right] = \beta' X + \delta + \rho\sigma_{e}\frac{\varphi(\omega' A)}{\Phi(\omega' A)}, \tag{15}$$

TABLE 9 Addressing self-selection—Heckman and Heckit selection models.

This table reports estimations after using Heckman and Heckit selection models to address self-selection regarding the impact of ESG reputational risk on firms' new investment, firm efficiency, underinvestment, and inefficiency. In columns (1), (4) and (6), (8), we show the first step of Heckman and Heckit estimations while in columns (2), (5) and (7),(9) we provide the second step. Variable definitions are provided in Table A1. Standard errors are reported in the parenthesis. All specifications include firms and year fixed effects. See Appendix. ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

	(1)	(2)	(4)	(5)	(6)	(7)	(8)	(9)
	Investment new	Investment new	Firm efficiency	Firm efficiency	Underinvestment	Underinvestment	Inefficiency	Inefficiency
Variables	First stage	Second stage	First stage	Second stage	First stage	Second stage	First stage	Second stage
CurrentRRI		−0.102***		−0.062***		0.811*		0.179***
		(0.024)		(0.014)		(0.424)		(0.061)
FreeCashFlow	−0.528***	−0.267***	−0.654***	0.200***	−0.492***	2.247***	−0.677***	−2.027***
	(0.140)	(0.020)	(0.131)	(0.012)	(0.142)	(0.385)	(0.131)	(0.276)
Tobin'sQ	0.061***	0.020***	0.046***	0.003***	0.062***	0.384***	0.048***	−0.128***
	(0.011)	(0.002)	(0.010)	(0.001)	(0.011)	(0.023)	(0.010)	(0.016)
Leverage	−0.517***	−0.032***	−0.369***	−0.042***	−0.466***	−0.702***	−0.365***	0.562***
	(0.083)	(0.012)	(0.075)	(0.006)	(0.085)	(0.172)	(0.075)	(0.104)
FirmAge	0.046**	−0.006**	0.088***	−0.001	0.038*	0.056	0.080***	0.162***
	(0.023)	(0.003)	(0.020)	(0.002)	(0.023)	(0.046)	(0.020)	(0.032)
CashFlowVol	0.456	0.295***	0.618*	0.233***	0.535	−0.190	0.561	−3.144***
	(0.398)	(0.049)	(0.368)	(0.031)	(0.404)	(0.828)	(0.366)	(0.590)
FirmSize	0.417***	0.030***	0.466***	0.006*	0.397***	0.029	0.470***	−0.068*
	(0.012)	(0.007)	(0.010)	(0.003)	(0.012)	(0.054)	(0.010)	(0.038)
InstitutionalHoldings	−0.757***	−0.008	−0.660***	0.046***	−0.745***	−0.254*	−0.669***	−0.073
	(0.064)	(0.013)	(0.059)	(0.006)	(0.065)	(0.146)	(0.058)	(0.091)

(Continues)

TABLE 9 (Continued)

Variables	(1) Investment new First stage	(2) Investment new Second stage	(4) Firm efficiency First stage	(5) Firm efficiency Second stage	(6) Underinvestment First stage	(7) Underinvestment Second stage	(8) Inefficiency First stage	(9) Inefficiency Second stage
DivYield	0.452	−0.055	0.486*	0.003	0.318	2.080***	0.475*	−0.116
	(0.304)	(0.036)	(0.274)	(0.021)	(0.312)	(0.618)	(0.274)	(0.384)
HHI	0.452***	−0.057***	0.290***	−0.084***	0.499***	0.032	0.279**	1.616***
	(0.116)	(0.015)	(0.108)	(0.008)	(0.117)	(0.217)	(0.109)	(0.188)
Religion	−0.029		0.082		0.004		0.125	
	(0.092)		(0.084)		(0.095)		(0.081)	
Blue	0.092***		0.101***		0.087***		0.084***	
	(0.019)		(0.017)		(0.020)		(0.017)	
Industry Share	0.008		0.051		0.008		0.071	
	(0.069)		(0.064)		(0.072)		(0.062)	
lambda		0.075***		0.032***		0.309		−0.782***
		(0.024)		(0.012)		(0.195)		(0.188)
Constant	−3.410***	−0.267***	−4.497***	0.690***	−3.516***	−1.965***	−4.738***	0.739*
	(0.581)	(0.075)	(0.531)	(0.038)	(0.595)	(0.535)	(0.508)	(0.416)
Observations	8421	8421	8421	8421	8248	8248	8421	8421
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES

Abbreviations: ESG, environmental, social, and governance; FE, fixed effects.

$$E\left[New\ \ Investment \mid DI_{i,t}=0\right]=\beta' X+\rho\sigma_e\frac{-\varphi(\omega' A)}{1-\Phi(\omega' A)}. \tag{16}$$

We subtract Equation (15) from Equation (16) and quantify the impact of ESG reputational risk on firms' new investment.[9]

$$\begin{aligned} &E\left[New\ \ Investment \mid DI_{i,t}=1\right]-E\left[New\ \ Investment \mid DI_{i,t}=0\right] \\ &\qquad =\delta+\rho\sigma_e\frac{\varphi(\omega' A)}{\Phi(\omega' A)(1-\Phi(\omega' A))}. \end{aligned} \tag{17}$$

In Equation (16) ω' is a vector with the estimated coefficients, φ stands for the function of the normal distribution, and Φ symbolizes the distribution function of the cumulative distribution function. Equation (17) captures the impact of ESG reputational risk on the firms' new investment via the δ coefficient. The potential selection bias is addressed and eliminated through a correction term which is defined as the Inverse Mills Ratio (IMR). IMR is calculated in the manner described below:

$$IMR=\frac{\varphi(\omega' A)}{\Phi(\omega' A)}\quad \text{if}\ \ DI_{i,t}=1\quad \text{or}\quad IMR=\frac{-\varphi(\omega' A)}{1-\Phi(\omega' A)}\quad \text{if}\ \ DI_{i,t}=0. \tag{18}$$

In Table 9 we provide the estimates of Heckman and Heckit two-step models which are used to correct for possible selection bias that may be as a result of unobservable factors with simultaneous impact on firms' ESG reputational risk and Investment. Our findings show that, when we address selection bias, a 1% rise in ESG reputational risk is with associated a decline in firms' New Investment and Efficiency by 10.2% and 6.2% and an increase in firms' investment inefficiency and underinvestment by 8.1% and 17.9%, respectively. These estimates confirm our initial findings arising from the baseline models that ESG reputational risk is related negative with firms' new investment activity and positive with firms' underinvestment and investment inefficiency.

7 | CONCLUSION

This study aims to examine the association between ESG reputational risk and a firm's new investment activity, investment efficiency, and the SOA towards the optimal investment. Investigating these relationships is particularly significant due to the extensively documented impact of ESG factors on various firm outcomes and given the fundamental importance of corporate investment at both the micro and macro level.

On the basis of empirical evidence from a sample of US firms, our findings support that ESG reputational risk negatively affects firms' investment activity. Additionally, we observe a positive relationship between ESG reputational risk and investment inefficiency, particularly in the presence of external financial constraints. Furthermore, our research demonstrates that firms with high ESG reputational risk display a slower adjustment of investment towards the optimal level compared with their counterparts with low ESG reputational risk.

[9]Similarly, we employ selection bias correction for firms Efficiency, firms' underinvestment, and firms Inefficiency. Firms' underinvestment and firms Inefficiency are binary variables consequently we use the Heckit estimator which is a version of the Heckman selection model that handles binary response variables.

This research contributes to the existing investment literature by enhancing our understanding of how ESG reputational risk influences the optimality of a firm's investment decisions. Given the increasing interest among academics and practitioners in identifying potential investment opportunities and risks associated with ESG materiality, the topic of this study becomes even more intriguing.

The findings of our study hold relevance for regulators and market participants, as the nexus between ESG and investment efficiency carries significant implications for firm valuation and economic growth. By recognizing the impact of ESG reputational risk on investment decisions, stakeholders can make more informed decisions and promote sustainable and responsible investment practices that align with long-term economic goals.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest

DATA AVAILABILITY STATEMENT

Data are available upon reasonable request. The data that support the findings of this study are publicly available from the sources noted in the text.

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APPENDIX

See Tables A1–A3.

TABLE A1 Variable definitions.

Variable	Definition	Source
Investment new	Total capital expenditures and acquisitions subtracting sale of property, plant, and equipment share of total assets.	Authors estimations based on Richardson's (2006) methodology
Overinvestment	Positive residuals of the estimated regression capture the "unexpected investments" (misinvestment).	Authors estimations based on Richardson's (2006) methodology
Underinvestment	Negative residuals of the estimated regression capture the "unexpected investments" (misinvestment).	Authors estimations based on Richardson's (2006) methodology
Efficiency	Measure of a firm's efficiency within its industry, based on data envelopment analysis, with values ranging from zero (inefficient firm) to one (fully efficient firm).	Constructed by the authors following the methodology of Demerjian et al. (2012) and using Compustat data
Inefficiency	Firm's investment efficiency is a dummy variable that takes the value of 1 if a firm invests inefficient, otherwise 0.	Constructed by the authors following the methodology of Demerjian et al. (2012) and using Compustat data
ESG reputational risks (RRI)	A company's current level of ESG reputational exposure to media and stakeholder attention, ranging from zero (lowest) to 100 (highest) and converted to range from 0 to 1.	RepRisk Global Business Intelligence Database
FreeCashFlow	Free Cash Flows as calculated by Richardson's (2006) accounting-based framework.	Author's calculations
TobinsQ	Market-to-book ratio, calculated as the market value of assets $((PRCC\_F * CSHO) + AT - CEQ)$ divided by the book value of assets (AT).	Compustat
Leverage	Total debt scaled by the book value of total assets.	Compustat
FirmAge	Number of years elapsing from a firm's foundation day.	Orbis database, J. R. Ritter (https://site.warrington.ufl.edu/ritter/ipo-data/)
CashFlowVol	Standard deviation of operating cash flows—rolling 3-year window.	Compustat
FirmSize	The natural logarithm of firm's total assets.	Compustat
HHI	Herfindahl–Hirschman index of industry concentration calculated using three-digit SIC codes.	Compustat

TABLE A1 (Continued)

Variable	Definition	Source
DivYield	A financial ratio equals the percentage rate of a company's share price that it pays out in dividends each year.	Compustat
SA Index	Hadlock and Pierce (2010) index: $= -0.737SIZE + 0.043SIZE2 - 0.040AGE$, where *SIZE* is the logarithm of total assets and *AGE* is the *FirmAge* variable.	Compustat
WW index	Whited and Wu (2006) index: $= -0.091CF - 0.062DD + 0.021LEV - 0.44LNTA + 0.102ISG - 0.035SG$, where *CF* is the operating cash flows scaled by the book value of total assets, *DD* is a dummy variable, which takes the value of 1 if a firm pays dividends and zero otherwise, *LEV* is the Leverage variable, *LNTA* is the Firm Size variable, and *ISG* is the firm's industry sales growth. Industry is defined as the three-digit industry SIC code, and *SG* is sales growth between t and $t-1$.	Compustat
KZ index	Kaplan and Zingales (1997) index: $0.238Q - 1.002CF + 3.139LEVR - 39.368DIV - 1.315CASH$, where *Q* is the *TobinsQ* variable, *CF* is operating cash flows scaled by the book value of total assets, *LEVR* is the leverage variable, *DIV* is cash dividends scaled by the book value of total assets, *CASH* is the firm's cash and cash equivalents dividend by the book value of total assets.	Compustat
CountrySectorAverageRRI	Average ESG of the sector (third digit-SIC code) that a firm belongs.	RepRisk Global Business Intelligence Database
Industry Share	The share of the total number of firms in a country's industry over the total number of firms in the sample that belong to the specific industry (SIC digit 3).	World data bank
DummyCurrentRRI	*DummyCurrentRRI* and *DummyPeakRRI* are indicator variables that take the value of one if *CurrentRRI*.	Author calculations
Industry Share	The proportion of firms in a given country's industry to all firms in the sample that are involved in that industry.	Author calculations
State Religion	Religion ranking of the state in which the issuer's headquarters are located. The ranking is based on the ratio of the number	Data on religiosity are obtained from the Association of Religion Data Archive, available at:

(Continues)

TABLE A1 (Continued)

Variable	Definition	Source
	of religious adherents in the issuer's state to the total population in that state in 2010.	http://www.thearda.com/Archive/Files/Descriptions/RCMSST10.asp
State Political Orientation	Dummy variable is equal to one if a firm's headquarters are in a Democratic state and zero, otherwise. A state is democratic if the Democratic Party won the last presidential election before the IPO announcement date in that state.	The list of democratic states is available at: https://en.wikipedia.org/wiki/Red_states_and_blue_states

Abbreviations: ESG, environmental, social, and governance; IPO, initial public offering; SIC, standard industrial classification.

TABLE A2 Pairwise correlations.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) *FreeCashFlow*	1.000							
(2) *Tobin'sQ*	−0.006	1.000						
(3) *Leverage*	0.052***	−0.199***	1.000					
(4) *FirmAge*	0.151***	−0.076***	0.048***	1.000				
(5) *CashFlowVol*	−0.474***	0.166***	−0.179***	−0.226***	1.000			
(6) *FirmSize*	0.363***	−0.115***	0.361***	0.377***	−0.393***	1.000		
(7) *InstitutionalHoldings*	0.244***	0.057***	0.085***	0.056***	−0.196***	0.361***	1.000	
(8) *DivYield*	0.229***	−0.073***	0.106***	0.140***	−0.151***	0.212***	0.094***	1.000

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

TABLE A3 Entropy matching weighting.

This table documents the entropy-balancing method. Panel A presents the mean, variance, and skewness between the treated and control groups before and after weighting. Panel B reports the entropy-balancing regression estimates. Variable definitions are reported in Table A1, Appendix. ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

Entropy-balancing weighting						
	Treat			**Control**		
	Mean	**Variance**	**Skewness**	**Mean**	**Variance**	**Skewness**
Before: Without weighting						
FreeCashFlow	−0.038	0.011	−3.411	−0.064	0.022	−3.137
Tobin'sQ	2.032	1.806	2.810	2.062	2.173	2.820
Leverage	0.234	0.030	0.547	0.192	0.036	0.867
FirmAge	29.180	84.600	0.517	22.490	92.600	0.999
CashFlowVol	0.042	0.001	2.874	0.054	0.002	2.509
FirmSize	8.031	2.637	−0.392	6.634	1.972	−0.295
InstitutionalHoldings	0.736	0.052	−1.084	0.709	0.070	−0.956
DivYield	0.039	0.002	1.955	0.031	0.002	2.508
HHI	0.118	0.015	2.792	0.107	0.013	3.286
After: Weighting variables						
FreeCashFlow	−0.038	0.011	−3.411	−0.038	0.010	−3.881
Tobin'sQ	2.032	1.806	2.810	2.032	2.218	3.275
Leverage	0.234	0.030	0.547	0.234	0.033	0.591
FirmAge	29.180	84.600	0.517	29.180	54.400	0.425
CashFlowVol	0.042	0.001	2.874	0.042	0.002	3.106
FirmSize	8.031	2.637	−0.392	8.031	1.712	−0.366
InstitutionalHoldings	0.736	0.052	−1.084	0.736	0.054	−1.136
DivYield	0.039	0.002	1.955	0.039	0.002	2.113
HHI	0.118	0.015	2.792	0.118	0.015	2.850