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From dawn to dusk: The relationship between CEO career horizon and ESG engagement

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ABSTRACT

This study investigates the influence of a CEO's career horizon on a firm's engagement in ESG. Given the private benefits which CEOs can extract from this strategy, we argue that a firm's willingness to pursue additional ESG efforts is likely to mirror CEOs' desire to strengthen their personal reputation and curb their perceived risk exposure at each stage of their career horizon. Drawing on the prospect theory, we theorize the decomposition of CEOs' career horizon into two counteracting forces (career concerns and legacy concerns) to explain how a CEO's effort in ESG could change depending on the length of the horizon and the influence of a reference point, such as their firm's performance relative to the industry benchmark. Using a sample of European listed companies from 2007 to 2018, our evidence supports an inverted U-shaped relationship between CEO career horizon and a firm's ESG engagement. This result shows the importance of a CEO's eagerness for personal reputation as a key antecedent of companies' ESG actions. However, a CEO's perceived risk exposure proves not to be a relevant driver of ESG, since we find that such a relationship is not sensitive to decision framing based on relative performance.

1. Introduction

Prior literature extensively echoes the advantages of ESG (environmental, social and governance) strategy for firms and their stakeholders. Risk management is emphasized as a primary target (Koh, Qian, & Wang, 2014; Shiu & Yang, 2017), which emerges from the accrual of a firm's moral capital and legitimacy (Godfrey, 2005; Godfrey, Merrill, & Hansen, 2009) as well as stakeholder trust enhancement (Lins, Servaes, & Tamayo, 2017). Moreover, ESG engagement can reflect the private interests of certain stakeholders who have the power to shape corporate strategy. Among these, CEOs wield a major influence as top decision-makers, such that their interests and personal traits are likely to play a central role in their corporate decisions. These interests and traits could offer alternative insights to enhance our understanding of the different ESG strategies observed across companies, since top managers bring their own personality, values and cognitive bases to deal with everyday problems and make strategic decisions accordingly (Hambrick, 2007; Hambrick & Mason, 1984). The so-called "CEO effect" is attributed a central role in firm strategy and its outcomes (Quigley & Hambrick, 2015). In this vein, Kang (2016) shows that CEOs who are nearing retirement reduce a firm's ESG efforts, although exactly how CEO willingness to engage in ESG might vary throughout their career remains an unexplored topic.

This research seeks to fill this gap by investigating the relationship between CEO career horizon and a firm's level of ESG engagement. We posit that a CEO's career horizon sparks two opposite forces (career concerns and legacy concerns) which shape CEOs' willingness to pursue ESG actions. We focus on two private benefits that CEOs may extract from ESG: on the one hand, a stronger reputation as top leaders due to their alignment with ESG values and moral capital, and on the other, a reduction in firm risk, which decreases the exposure of their undiversified human capital investment. To elaborate our arguments, we examine how these private benefits for CEOs evolve throughout their career horizon. We argue that CEOs might prioritize gaining personal reputation to a different extent depending on which stage of their career they are at, as a result of the combination of career concerns and legacy concerns, which might have a different impact on their perceived need for personal reputation. In particular, we contend that a CEO's career and legacy concerns may involve two opposing forces that drive an inverted U-shaped relationship between CEO age and ESG engagement.

Second, we delve into CEOs' private interest in alleviating their perceived exposure to a firm's risk through ESG engagement. Given such insurance benefits from ESG, this strategy's implementation is likely to depend on top managers' own risk perception. While previous research

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has applied prospect theory premises to other insurance strategies such as corporate diversification (Hutzschenreuter, Kleindienst, Groene, & Verbeke, 2014), whether it also applies to ESG still awaits further attention. From the prospect theory, individuals' interpretations are unavoidably affected by their framing, which leads them to assess potential outcomes of their decisions and perceived risk based on a neutral reference point. The prospect theory expects individuals to be more risk averse when outcomes represent gains (performance above the reference point) and to become more risk-seekers in contexts of losses (performance below the reference point) (Fiegenbaum & Thomas, 1988; Holmes, Bromiley, Devers, Holcomb, & McGuire, 2011). Consequently, such an inverted U-shape between CEO career horizon and ESG engagement is likely to be affected by the firm's performance relative to its industry benchmark (Hirshleifer, 1993). We argue that if a firm's relative performance shapes its CEO's risk aversion, the influence of career and legacy concerns over the propensity to implement additional ESG actions will differ between overperformers and underperformers. Should CEOs rely on ESG engagement to reduce their perceived risk exposure, they will be more likely to increase their ESG efforts when the firm outperforms its industry peers and to reduce them when a firm underperforms. Based on these premises, we hypothesize a shift in the inverted U-shaped curve.

Our hypotheses are tested on a sample of listed European companies during the 2007–2021 period. Results support the curvilinear association between CEO age and ESG engagement: younger CEOs display ever increasing engagement to ESG up to a turning point in their age, after which CEO eagerness to pursue additional improvements in ESG is reversed. Maximum ESG engagement is reached when the CEO is around 53 years old. However, a CEO's perceived risk exposure motivation is not relevant and such risk behaviour in the ESG context shifts from conventional prospect theory contentions, since a firm's performance relative to its industry benchmark does not affect a CEO's ESG efforts.

The remainder of the paper is structured as follows. Section 2 sets out the theoretical background from which our empirical propositions are derived. Section 3 describes the sample, variables and empirical models to test the hypotheses. Section 4 presents and discusses the main results and provides a number of sensitivity analyses. Finally, Section 5 concludes.

2. Theoretical background and hypotheses

Personal traits, values and background of top managers (e.g., CEOs) are reflected in their corporate strategies and outcomes (Hambrick, 2007; Hambrick & Mason, 1984; Wang, Holmes Jr., Oh, & Zhu, 2016). Since individuals have limited rationality, top managers draw on their cognitive base and values to perceive environmental and organizational stimuli (Hambrick & Mason, 1984). These are found to influence their strategic decisions, with ESG engagement being no exception (Arena, Michelon, & Trojanowski, 2018; Fu, Tang, & Chen, 2020; O'Sullivan, Zolotoy, & Fan, 2021; Sajko, Boone, & Buyl, 2021).

A firm's engagement in ESG grants CEOs a number of benefits at the private level. On the one side, a stronger alignment of their firms with the values associated with ESG and moral capital help strengthen the professional and personal reputation of CEOs as top leaders of such firms (Borghesi, Houston, & Naranjo, 2014; Cai, Gao, Garrett, & Xu, 2020; Kang, 2016). On the other side, ESG sparks risk-management benefits (Godfrey, 2005; Godfrey et al., 2009; Jia, Gao, & Julian, 2020; Koh, Qian, & Wang, 2014; Shiu & Yang, 2017), which become particularly salient during crisis episodes (Lins et al., 2017). Given that CEOs have their undiversifiable human capital allocated in the firm (Wang, Barney, & Reuer, 2003), they are personally interested in mitigating a firm's risk in order to curb their perceived risk exposure. In fact, CEOs purposely draw on ESG in order to reap its insurance-like benefits (Jia et al., 2020). Consequently, ESG engagement might mirror CEO risk-taking (Borghesi et al., 2014; Chintrakarn, Jiraporn, & Treepongkaruna, 2021; He, Ding, Yue, & Liu, 2023). Stronger CEO risk appetite might lead them to underestimate risks and, therefore, weaken ESG efforts (McCarthy, Oliver, & Song, 2017; Sajko et al., 2021). In contrast, firms with less risk-seeking CEOs are likely to exhibit stronger ESG engagement.

2.1. CEO career horizon and ESG engagement

A CEO's career horizon is the "amount of time remaining until a CEO reaches retirement age" (Krause & Semadeni, 2014, p. 813). It is a key variable that determines their desire for a stronger personal and professional reputation and, consequently, their willingness to engage in additional ESG. Recent works such as Cai et al. (2020) go along with this idea by showing that CEOs are judged on the ESG-based reputation of their companies, which can enhance their professional prospects. We draw on Haans, Pieters, and He (2016) to delve into the rationale for the joint influence from two counteracting forces: CEO career concerns and CEO legacy concerns.[1] Fig. 1 illustrates the two forces and their additive effect. For the sake of easier interpretation, the X-axis is based on CEO age, which is an inverse proxy for career horizon.

On the one hand, the force of career concerns reflects CEOs' worries about their labour market evaluation and career prospects (Antia, Pantzalis, & Park, 2010; Gibbons & Murphy, 1992; Kang, 2016; Nadeem, Zaman, Suleman, & Atawnah, 2021). Career concerns are greater the further the CEO is from retirement (Gibbons & Murphy, 1992), and peak at the beginning when they are younger. At this stage, CEOs are likely to display stronger ESG engagement as a strategic insurance tool to strengthen their professional and personal reputation as corporate leaders. As CEOs become older and reach later-career stages, lower career concerns might reduce their need to nurture their reputation and would therefore weaken additional ESG engagement. The career concerns curve will reach zero in the X-axis at retirement when career concerns no longer exist. Moreover, there might be increasing marginal reduction because a CEO's relief from career concerns is more prominent when near retirement (Kang, 2016; McClelland, Barker III, & Oh, 2012).

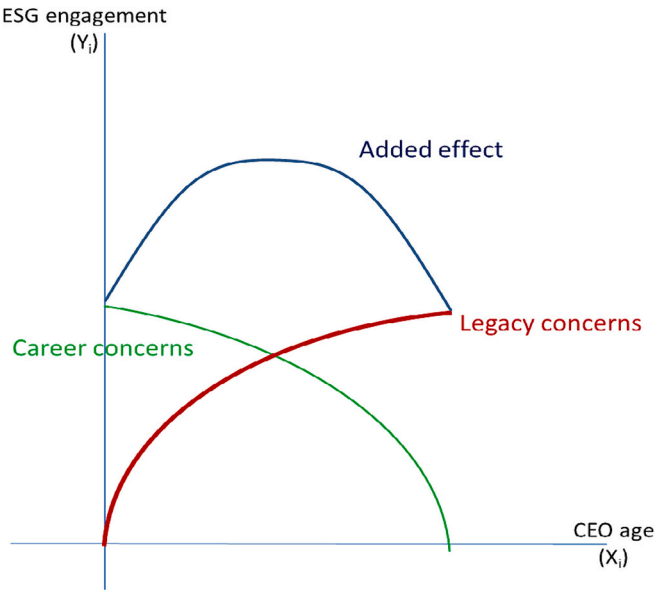

Fig. 1. CEO career horizon (CEO age) and ESG engagement.

[1] The approach by Haans et al. (2016) helps to theorize the counterbalancing forces whose addition produces a non-linear relationship. This approach aims to identify the two causal underlying mechanisms which drive the relationship between CEO career horizon and a firm's ESG engagement, and provide the theoretical rationale on which we build our arguments.

Fig. 1 depicts this negative association between CEO age and additional ESG engagement as engendered by career concerns.

On the other hand, legacy concerns represent CEOs' worries about preserving a legacy of success as their lasting imprint within the firm (Bilgili, Campbell, O'Leary-Kelly, Ellstrand, & Johnson, 2020; Gao, Hua, Liu, & Yan, 2023; Kang, 2016; Matta & Beamish, 2008;). Stronger legacy concerns drive CEO willingness to avoid damaging their personal reputation and legacy associated with socially responsible actions (Kang, 2016; Matta & Beamish, 2008), which are likely to stimulate ESG engagement. Logically, these concerns increase with CEO age, although the increasing marginal effect might diminish when they are older due to the long-term nature of additional ESG engagement, as Fig. 1 shows.

Considering these two counteracting underlying mechanisms jointly, Fig. 1 shows how the resulting added effect causes an inverted U-shaped relationship between CEO age and ESG engagement. Hence, we hypothesize:

H1. CEO age displays an inverted U-shaped relationship with ESG engagement.

2.2. CEO career horizon and ESG engagement: The decision-framing effect

Perceived outcomes from ESG (and in particular, CEOs' perceived need for risk management) may depend on corporate performance relative to a reference (or target) performance level (Holmes et al., 2011). Prospect theory states that decisions are reference-dependent and that decision-makers exhibit a mixture of risk-seeking and risk-averse behaviour (Fiegenbaum & Thomas, 1988; Kahneman & Tversky, 1979). They are expected to have risk-seeking choices when performing below the reference point, whereas they become risk averse when performing above the reference point (Fiegenbaum & Thomas, 1988; Holmes et al., 2011).

In our research setting, we delve into how firm performance vis-à-vis the industry performance benchmark shapes the career and legacy concern mechanisms discussed earlier, thereby moderating the CEO career horizon-ESG engagement relationship. Under an outperformance scenario, CEOs might become more risk averse according to the prospect theory (Fiegenbaum & Thomas, 1988), and might perceive the potential loss of current performance status as a more serious threat. Therefore, risk management will have greater importance for them, and would lead them to prioritize additional ESG efforts in order to safeguard both their career and legacy concerns. As Fig. 2 depicts, both forces shift upward, with the departing level of ESG for the career concern curve and the end-level of the legacy curve increasing. In contrast, the two counterbalancing mechanisms might be influenced in the opposite way in an underperformance scenario as a result of greater CEO risk appetite and a lower incentive to implement additional ESG for risk management.

Moreover, we contend that career concern and legacy concern mechanisms might not display the same degree of response to performance framing. We expect the legacy curve to be more sensitive to the decision-framing effect, with this curve displaying a more prominent movement upward (downward) in ESG engagement, under an outperformance (underperformance) scenario, as illustrated in Fig. 2. This is because, whereas young CEOs face long-term horizons to gradually adapt their strategic decisions to their risk appetite, older CEOs are subject to short-term horizons that demand a more substantial response. Overall, the greater sensitivity to the decision-framing effect for legacy concerns results in shifting the turning point of the added effect curve to the right (left) for outperformers (underperformers). Taking all these arguments together, we hypothesize:

H2. Performance framing moderates the inverted U-shaped relationship between CEO age and ESG engagement such that the maximum of the curve shifts to the right (left) if the firm outperforms (underperforms) the reference point.

3. Empirical design

3.1. Data and sample

Our sample consists of European publicly traded companies from 2007 to 2021.[2] We gather financial data from Worldscope, and ESG data by Refinitiv, both of which were accessed through the *Eikon* platform. Refinitiv is considered to provide objective, auditable and systematic information on ESG initiatives. Data on corporate governance comes from NRG Metrics. Recent studies report that this latter database offers good coverage for large-cap indices worldwide, and indeed it has been drawing on a large team of expert analysts to review and hand-collect detailed information on corporate governance characteristics from firms' annual reports since 2007 (Attig, El Ghoul, Guedham, & Zheng, 2021).

We exclude countries with excessively poor (or no) coverage of ESG data. The final sample comprises firms from 18 European countries: Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland, and the United Kingdom. We apply a number of selection criteria to build our final sample. First, we eliminate those firms operating in the finance and insurance sector (SICs from 6000 to 6499 and from 6700 to 6799), and those with negative common equity. Additionally, we convert ESG scores from a 100-point scale to a 10-point one so as to avoid heteroscedasticity problems (Cheng, Ioannou, & Serafeim, 2014; Fuente, Ortiz, & Velasco, 2022). Finally, we winsorize our variables (except for governance and ESG variables, which do not display extreme outlier observations) at the 1st and 99th percentiles. Observations with missing data on our key variables are also omitted. All of these sample selection criteria lead to a final sample of 7982 firm-year observations corresponding to 991 companies. Table 1 presents the sample distribution by year and country. The number of observations is seen to have grown in more recent years due to increasing ESG data coverage. The countries with the highest portion of observations in our sample are the UK (27.57%), France (14.73%), and Germany (12.63%).

3.2. Variables

Table A.1. of the Appendix summarizes the definitions of our variables.

3.2.1. Dependent variable: ESG engagement

Following previous literature (Cheng et al., 2014; Fuente et al., 2022; Gomes, 2019), we measure ESG engagement by the equally-weighted average of the scores of the three pillars of ESG (environmental, social, and governance) (*ESGscore*). Alternatively, we also use the average between the scores of the environmental pillar and the social pillar (*ESscore*) for additional robustness since some works do not consider the governance pillar to be a dimension of a firm's sustainability strategy (Lins et al., 2017).

3.2.2. Explanatory and moderating variables

We proxy CEO career horizon by a firm's CEO age (Cho & Kim, 2017; McClelland et al., 2012). This is an inverse proxy since the older the CEO, the shorter their career horizon. As regards our moderating variable of a firm's relative performance, we base it on a firm's return on assets (*ROA*) relative to the median *ROA* of their industry peers each year. To identify the industry which each firm belongs to, we apply the

[2] The time span of our sample seems of particular interest given the substantial changes in ESG regulation that have been implemented in Europe over the last few years, such as the Sustainable Finance Action Plan in 2018 and the European Green Deal in 2020. We thank an anonymous reviewer for raising this issue.

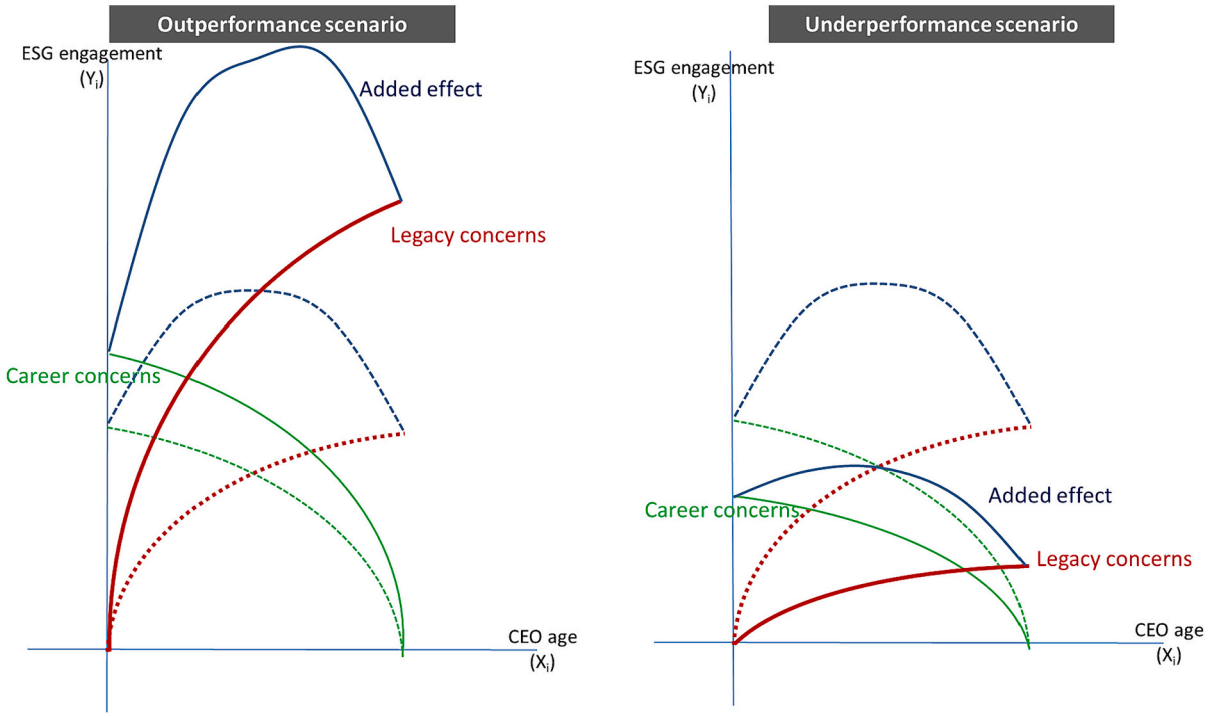

Fig. 2. CEO career horizon (CEO age) and ESG engagement: the decision framing effect.
Note: dotted lines represent the baseline situation. Solid lines represent the situation of outperformance scenario (in the graph on the left) and the situation of underperformance scenario (in the graph on the right).

48-Fama and French (1997) industry classification scheme. We construct a dummy variable (*dumROA_indFF*) which equals one if a firm's *ROA* is above each year's industry median (outperformer), and zero otherwise (underperformer).[3] For robustness purposes, we alternatively use the 2-digit SIC classification, as well as the SIC division scheme[4] by the U.S. Department of Labor (Fuente et al., 2022) which classifies 2-digit SIC codes into 10 divisions (*dumROA_indDIV*). These three alternative dummy definitions allow us to identify industry outperforming firms and industry underperforming ones to test Hypothesis 2.

3.2.3. Control variables

Following earlier research (Fu et al., 2020; Jia et al., 2020; Oh, Cha, & Chang, 2017), we consider a number of controls about firm-level financial characteristics, which are expected to influence a firm's ESG engagement: financial performance (*ROA*), firm size (*SIZE*), firm leverage (*LEV*), cash reserves (*CASH*), asset tangibility (*TANG*), and investment opportunities (*INVEST*). Larger, better performing and richer cash companies are likely to allocate more resources to ESG actions due to the greater availability of financial resources and more visibility. In contrast, greater debt obligations reduce available resources and might curtail ESG. Asset structure is likely to affect firm investment such as ESG, and broader investment opportunities might add an opportunity cost to ESG actions. Moreover, we control for governance-related characteristics (Fu et al., 2020; Oh et al., 2017) since better governed companies usually display greater ESG engagement: board size (*BOARDSIZE*), board independence (*BOARDINDEP*), CEO duality (*CEOduality*), and institutional ownership (*INSTOWN*). Finally, we add year, industry (based on divisions by the U.S. Department of Labor), and country dummies.

3.3. Empirical models and estimation methodology

Our equations are estimated by Tobit regression. This censored regression approach seems appropriate because our dependent variable (ESG engagement) is a continuous measure bounded at zero and 10 (Jia & Li, 2020). Such a range restriction makes ordinary least squares potentially unsuitable (Amore & Murtinu, 2021). Following Petersen (2009), we estimate a pooled Tobit and control for firm fixed effect (i.e. residual correlation) by clustering standard errors by firm.[5]

Our baseline model to test the inverted U-shaped relationship between a firm's CEO age and ESG engagement (proposed in Hypothesis 1) is specified as follows:

$$ESG_{i,t} = \beta_0 + \beta_1 * CEOage_{i,t} + \beta_2 * CEOage^2{}_{i,t} + \beta_3 * CONTROLS_{i,t} + YEAR_t + INDUSTRY_j + COUNTRY_k + \varepsilon_{i,t} \quad (1)$$

where *i*, *t*, *j* and *k* denote each firm, year, industry, and country, respectively. $ESG_{i,t}$ represents a firm's engagement in ESG, which is measured by *ESGscore* (and alternatively, *ESscore* for robustness). $CONTROLS_{i,t}$ is the vector of control variables. $YEAR_t$, $INDUSTRY_j$, and $COUNTRY_k$ are the sets of dummies to control for time-, industry- and country-fixed effects, respectively. $\varepsilon_{i,t}$ is the error term.

To test Hypothesis 2, we extend the baseline equation by adding the moderating role of a firm's relative performance to its industry peers on

[3] Robustness analyses were conducted by calculating this dummy with reference to each year's industry performance in each country. We decided to discard "country" when calculating industry performance in order to maximize sample size in each industry and reach more meaningful median performance values. Moreover, most listed European firms compete with industry peers worldwide.

[4] Information about the correspondence of these industry divisions with SIC codes is provided in the official website: https://www.osha.gov/pls/imis/sic_manual.html.

[5] We opted not to apply a Tobit fixed-effect estimation because previous literature raises concerns that this might possibly drive an incidental parameter problem which produces biased and inconsistent estimates (Amore & Murtinu, 2021; Greene, 2004).

Table 1
Sample distribution by year and country.

Panel A: Distribution of firm-year observations by year		
Year	No. of observations	% of observations
2007	403	5.05
2008	418	5.23
2009	452	5.66
2010	485	6.08
2011	529	6.63
2012	532	6.66
2013	516	6.46
2014	513	6.43
2015	525	6.58
2016	534	6.69
2017	572	7.17
2018	758	9.50
2019	531	6.65
2020	608	7.62
2021	606	7.59
Total	**7982**	**100.00**

Panel B: Distribution of firm-year observations by country		
Country	No. of observations	% of observations
Austria	162	2.03
Belgium	208	2.60
Czech Republic	33	0.41
Denmark	288	3.61
Finland	368	4.61
France	1176	14.73
Germany	1008	12.63
Greece	82	1.03
Ireland	129	1.62
Italy	510	6.39
The Netherlands	282	3.53
Norway	198	2.48
Poland	26	0.33
Portugal	90	1.13
Spain	187	2.34
Sweden	383	4.80
Switzerland	651	8.16
The UK	2201	27.57
Total	**7982**	**100.00**

This table shows the distribution of firm-year observations by year (Panel A) and by country (Panel B). The sample comprises an unbalanced panel of listed companies from 18 European countries during the 2007–2021 period.

the CEO age-ESG engagement relationship (Eq. (2)):

$$ESG_{i,t} = \gamma_0 + \gamma_1 {}^{*}CEOage_{i,t} + \gamma_2 {}^{*}CEOage^2{}_{i,t} + \gamma_3 {}^{*}CEOage_{i,t} {}^{*}dumROAind_{i,t} + \gamma_4 {}^{*}CEOage^2{}_{i,t} {}^{*}dumROAind_{i,t} + \gamma_5 {}^{*}CONTROLS_{i,t} + YEAR_t + INDUSTRY_j + COUNTRY_k + \varepsilon_{i,t} \quad (2)$$

where $dumROAind_{i,t}$ denotes a firm's performance dummy relative to its industry benchmark (either *dumROA_indFF* or *dumROA_ind3d*). γ_1 and γ_2 capture the non-linear effect of CEO age on a firm's ESG engagement for below-median industry performance firms (i.e., underperformers), and by ($\gamma_1 + \gamma_3$) and ($\gamma_2 + \gamma_4$) for above-median industry performance firms (i.e., overperformers). Haans et al. (2016) distinguish two types of moderating effects in curvilinear relationships: curve flattening or steeping, and turning point shift. Hypothesis 2 proposes the latter type. Therefore, we first need to verify that γ_3 and γ_4 are not statistically significant, which implies that the shape (slopes) of the curvilinear relationship between CEO age and ESG engagement is not affected by the performance framing. This will serve to discard the presence of curve flattening or steeping. Second, we follow Haans et al.'s (2016) procedure to formally test whether the turning point shifts when the moderating variable (*dumROAind*) changes.

4. Results

4.1. Descriptive statistics

Table 2 summarizes the descriptive statistics. On average, sample firms exhibit an ESG engagement score of about 5.35 out of 10, and average CEO age is about 54 years old. Therefore, if we assume a 70 year-old retirement age, our average sample CEO has a career horizon of 16 more years ahead. Table 3 presents the pairwise correlation matrix of our variables. *CEOage* is positively correlated with *ESGscore* (0.1188, $p < 0.01$) and *ESscore* (0.1548, $p < 0.01$), and negatively correlated with *ROA* (−0.0552, $p < 0.01$).

4.2. Baseline model: CEO career horizon and ESG engagement

Table 4 reports the Tobit estimation results of Eq. (1) concerning the effect of CEO career horizon (CEO age) on a firm's ESG engagement. Panel A contains the estimations using *ESGscore* as the dependent variable proxy. Column (1) shows the estimates only with control variables included. As expected, superior financial performance, larger firm size, richer cash reserves, larger boards and boards with a stronger presence of independent directors have a positive impact on *ESGscore*. In contrast, higher leverage, stronger investment opportunities and CEO duality are negatively associated with *ESGscore*.

Column (2) displays the results of the linear model. The effect of *CEOage* on *ESGscore* is not significantly different from zero ($\beta_1 = -0.0030$, $p > 0.10$). Interestingly, when we also consider the quadratic term of *CEOage* in Column (3), results suggest an inverted U-shaped relationship between CEO age and *ESGscore*, supporting our Hypothesis 1. The estimated coefficient of the linear term *CEOage* is positive ($\beta_1 = 0.1045$, $p < 0.01$) whereas that of the quadratic term *CEOage_sq* is

Table 2
Descriptive statistics.

Variable	N	Mean	SD	p25	Median	p75
ESG engagement						
ESGscore	7982	5.3553	1.9431	3.9556	5.4260	6.8816
ESscore	7982	5.3764	2.3097	3.5975	5.5275	7.2720
CEO career horizon						
CEOage	7982	54.2400	6.9712	50	54	59
Control variables						
ROA	7982	0.0556	0.0830	0.0280	0.0537	0.0872
SIZE	7982	15.139	1.590	14.059	15.095	16.152
LEV	7982	0.2548	0.1634	0.1330	0.2432	0.3604
CASH	7982	0.0918	0.0930	0.0316	0.0650	0.1203
TANG	7982	0.5025	0.3907	0.1915	0.3863	0.7644
INVEST	7982	0.0430	0.0374	0.0183	0.0333	0.0558
BOARDSIZE	7982	2.2783	0.3755	2.0794	2.3025	2.4849
BOARDINDEP	7982	0.6010	0.2225	0.4600	0.5700	0.7500
CEOduality	7982	0.2350	0.4240	0	0	0
INSTOWN	7982	0.1497	0.1677	0	0.0989	0.2429

This table summarizes the main descriptive statistics of the final sample. ESG engagement is captured by *ESGscore* (the average of the scores of the environmental, social, and governance pillars) and *ESscore* (the average of the scores of the environmental and social pillars), both of which are based on a 10-point scale. CEO career horizon is approximated by *CEOage* (a firm's CEO age in years). Control variables are: *ROA* (a firm's financial performance as return on assets), *SIZE* (a firm's size as the natural logarithm of the book value of total assets), *LEV* (leverage as the ratio of total debt to the book value of assets), *CASH* (cash reserves as the ratio of cash to the book value of assets), *TANG* (asset tangibility as the ratio of property, plant and equipment to the book value of assets), *INVEST* (investment opportunities as the ratio of CAPEX to the book value of assets), *BOARDSIZE* (the natural logarithm of the number of board directors), *BOARDINDEP* (the ratio of the number of independent directors to total board directors), *CEOduality* (a dummy variable equal to one if the CEO is also the board chair, zero otherwise), and *INSTOWN* (the percentage of shares held by institutional investors). All variables are winsorized at the 1st and 99th percentiles (except for ESG and governance variables, which do not display extreme outlier observations).

Table 3
Spearman's pairwise correlations.

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1.ESGscore	1												
2.ESscore	0.9398***	1											
3.CEOage	0.1188***	0.1548***	1										
4.ROA	0.0041	0.0164	−0.0552***	1									
5.SIZE	0.6060***	0.6221***	0.1543***	−0.0002	1								
6.LEV	0.1004***	0.1083***	0.0421***	−0.1763***	0.2289***	1							
7.CASH	−0.1332***	−0.1518***	−0.0054	−0.1272***	−0.3401***	−0.2349***	1						
8.TANG	0.0953***	0.1097***	−0.0331***	−0.0101	0.1779***	0.1717***	−0.2530***	1					
9.INVEST	−0.0372**	−0.0393**	−0.0936***	0.0937***	0.0274**	0.0661***	−0.1392***	0.5661***	1				
10.BOARDSIZE	0.3684***	0.4107***	0.1301***	−0.0395***	0.6011***	0.1319***	−0.1960***	0.1530***	0.0518***	1			
11.BOARDINDEP	0.0801***	0.0464***	−0.0758***	0.0171	0.0112	−0.0547***	0.0343***	0.0055	−0.0322***	−0.2073***	1		
12.CEOduality	0.0175	0.0947***	0.1267***	0.0012	0.1194***	0.0186*	0.0167	−0.0555***	−0.0309***	0.1645***	−0.1223***	1	
13.INSTOWN	−0.1436***	−0.1898***	−0.1327***	0.0046	−0.2755***	−0.0595***	−0.0020	−0.0331***	−0.0242**	−0.2459***	0.0271**	−0.1340***	1

This table shows the pairwise Spearman correlation coefficients for our study's variables. All of them are winsorized at the 1st and 99th percentiles (except for ESG and governance variables, which do not display extreme outlier observations). ***, ** and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

negative ($\beta_2 = -0.0010, p < 0.01$), with both being beyond the 1% level of statistical significance. At the bottom of this column, we see that the maximum value of the curve is reached at *CEOage** = 53.52 years old, which is within the range of our data and slightly below the sample average. This finding confirms that CEOs with a long career horizon (younger CEOs) are willing to pursue additional increases in their firms' ESG engagement as they get older. This result is consistent with younger CEOs –as they become older– increasing their legacy concerns at a faster rate than at which they reduce their career concerns. When some 16 years of career horizon remain until retirement age (broadly assumed to be 70 years old in previous works, e.g., Matta & Beamish, 2008), such behaviour reverses and CEOs exhibit a gradually diminishing propensity to implement additional ESG actions as they grow old. This evidence supports the hypothesis that –in the latter stages of a CEO's time in office– their career concerns decrease at a faster rate than at which their legacy concerns increase.

Panel B of Table 4 summarizes additional analyses to verify the robustness of our findings. First, Column (4) repeats the estimations using *ESscore* as a dependent variable, with results remaining similar. Columns (5) to (7) are based on the ESG pillars, considering the environmental pillar (*ENV*), the social pillar (*SOC*), and the governance pillar (*GOV*) scores. Results confirm the inverted U-shaped relationship between CEO age and a firm's engagement in the environmental and social pillars, but not for the governance pillar. In regressions with *GOV* as the dependent variable, the linear term *CEOage* displays no statistical significance ($\beta_1 = 0.0170, p > 0.10$; $\beta_2 = -0.0003, p > 0.10$). Except for *GOV*, in the remaining cases the inverted-U association between *CEOage* and the alternative proxies for ESG is confirmed. The turning point of the curve is reached in the CEO age range of between 53 and 58 years old. This is consistent with prior evidence (Bannier, Bofinger, & Rock, 2022; Zhao, Fang, & Zhang, 2023) which attributes greater legitimacy and credibility to efforts made in the environmental and social pillars as a result of being associated with a broader range of stakeholders.

4.3. The influence of decision framing on the relationship between CEO career horizon and ESG engagement

In this section, we perform a number of analyses to test Hypothesis 2 concerning the moderation of the inverse U-shaped relationship between CEO age and ESG engagement by a firm's relative performance (compared with its industry benchmark), which might cause a turning point shift. Table 5 reports the Tobit estimation results of Eq. (2) considering interaction effects between CEO age and the alternative dummies (based on different industry classification schemes) to identify industry overperformers and underperformers. The interaction effects display no statistical significance across all regressions. For example, when based on the 48-Fama-French industry classification in Column (1), the coefficient of *CEOage*×*dumROA_indFF* is negative ($\gamma = -0.0037$, $p > 0.10$) and the non-linear interaction effect is positive ($\gamma = 0.0001$, $p > 0.10$), although both lack statistical significance. Although the absolute value of the coefficient associated with the non-linear effect is lower for above-median industry performing firms ($\sum \text{nonlinear} = \gamma_2 + \gamma_4 = -0.0009$) than for below-median industry performers ($\gamma_2 = -0.0010$), we rule out the existence of curve flattening since the difference between the two coefficients cannot be considered statistically significantly different from zero (i.e., interaction effects are not significant).

We follow Haans et al.'s (2016) procedure to formally test whether a moderation in the form of a turning point shift occurs in the inverted U-relationship. The turning point *CEOage** of Eq. (2) is as follows:

$$CEOage^{*} = \frac{-\gamma_1 - \gamma_3 \bullet dumROAind}{2 \bullet \gamma_2 + 2 \bullet \gamma_4 \bullet dumROAind} \quad (3)$$

which depends on the moderator (*dumROAind*). Taking the first derivative of the previous expression with respect to the moderating variable, we obtain:

Table 4
CEO career horizon (CEO age) and ESG engagement.

	Panel A: Main analyses			Panel B: Alternative measures of sustainability performance: Robustness analyses			
	Dependent variable: ESGscore			Dependent variable: ESscore	Dependent variable: ENV	Dependent variable: SOC	Dependent variable: GOV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	−6.9610***	−6.8165***	−9.6485***	−13.1476***	−15.6946***	−10.8629***	−2.7741*
	(0.3829)	(0.4457)	(1.1337)	(1.4437)	(1.8006)	(1.4650)	(1.4235)
CEOage		−0.0030	0.1045***	0.1501***	0.1543**	0.1407***	0.0170
		(0.0046)	(0.0395)	(0.0510)	(0.0646)	(0.0510)	(0.0500)
CEOage_sq			−0.0010***	−0.0013***	−0.0014**	−0.0012***	−0.0003
			(0.0003)	(0.0004)	(0.0006)	(0.0004)	(0.0005)
Control variables							
ROA	0.7753**	0.7726**	0.7804**	1.3954***	2.0570***	1.2957***	−0.4417
	(0.3238)	(0.3235)	(0.3236)	(0.4106)	(0.5321)	(0.4552)	(0.3853)
SIZE	0.7929***	0.7943***	0.7927***	0.8752***	0.9831***	0.7902***	0.6284***
	(0.0306)	(0.0306)	(0.0305)	(0.0345)	(0.0399)	(0.0380)	(0.0395)
LEV	−0.6877***	−0.6887***	−0.6987***	−0.6695**	−0.8437**	−0.5569*	−0.7517***
	(0.2394)	(0.2394)	(0.2397)	(0.2859)	(0.3471)	(0.3015)	(0.2872)
CASH	1.2149***	1.2113***	1.2237***	1.1020***	0.5549	1.2654***	1.4617***
	(0.3303)	(0.3306)	(0.3296)	(0.3977)	(0.5093)	(0.4397)	(0.4133)
TANG	0.4686***	0.4704***	0.4658***	0.6472***	0.9909***	0.3252**	0.1044
	(0.1289)	(0.1292)	(0.1287)	(0.1514)	(0.1845)	(0.1599)	(0.1658)
INVEST	−2.4309**	−2.4855**	−2.4174**	−3.3655***	−4.1967***	−2.6422**	−0.5045
	(1.0470)	(1.0512)	(1.0447)	(1.2830)	(1.5545)	(1.3105)	(1.3472)
BOARDSIZE	0.4489***	0.4504***	0.4364***	0.6948***	0.7702***	0.6330***	−0.0807
	(0.1331)	(0.1332)	(0.1325)	(0.1491)	(0.1769)	(0.1598)	(0.1692)
BOARDINDEP	0.6683***	0.6642***	0.6419***	0.3108	0.2422	0.4124*	1.3044***
	(0.1712)	(0.1714)	(0.1698)	(0.2011)	(0.2358)	(0.2180)	(0.2188)
CEOduality	−0.2402***	−0.2376***	−0.2246***	0.0543	0.0534	0.0630	−0.7812***
	(0.0837)	(0.0835)	(0.0838)	(0.0984)	(0.1134)	(0.1085)	(0.1144)
INSOWN	0.3240	0.3224	0.2928	0.0200	0.2207	−0.1352	0.8412***
	(0.2231)	(0.2231)	(0.2226)	(0.2580)	(0.2947)	(0.2912)	(0.2926)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	7982	7982	7982	7982	7982	7982	7982
Pseudo R2	0.1564	0.1564	0.1571	0.1538	0.1348	0.1178	0.0585
Estimated extreme point	–	–	53.5200	57.0646	56.4948	57.7688	–

This table summarizes the Tobit estimation results of Eq. (1). The dependent variable is a firm's ESG engagement, which is measured by the *ESGscore* (the average of the scores of the environmental, social, and governance pillars) and *ESscore* (the average of the scores of the environmental and social pillars). Additional robustness analyses are shown for individual pillars by using *ENV* (environmental pillar score), *SOC* (social pillar score) and *GOV* (governance pillar score). CEO career horizon measure is *CEOage* (a firm's CEO age in years). Control variables are: *ROA* (a firm's financial performance as return on assets), *SIZE* (a firm's size as the natural logarithm of the book value of total assets), *LEV* (leverage as the ratio of total debt to the book value of assets), *CASH* (cash reserves as the ratio of cash to the book value of assets), *TANG* (asset tangibility as the ratio of property, plant and equipment to the book value of assets), *INVEST* (investment opportunities as the ratio of CAPEX to the book value of assets), *BOARDSIZE* (the natural logarithm of the number of board directors), *BOARDINDEP* (the ratio of the number of independent directors to total board directors), *CEOduality* (a dummy variable equal to one if the CEO is also the board chair, zero otherwise), and *INSTOWN* (the percentage of shares held by institutional investors). All regressions control for country, year and industry fixed effects. At the bottom of regressions considering the non-linear effect of *CEOage*, the estimated extreme point of the curvilinear relationship is included. Standard errors are shown in parentheses under coefficients. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

$$\frac{\partial CEOage^{*}}{\partial dumROAind} = \frac{\gamma_1 \bullet \gamma_4 - \gamma_2 \bullet \gamma_3}{2 \bullet (\gamma_2 + \gamma_4 \bullet dumROAind)^2} \quad (4)$$

Since the latter expression depends on the moderating variable *dumROAind*, we first need to assign specific values to this variable (namely zero and 1) and then conduct the test of whether Eq. (4) is significantly different from zero.[6] Should this be the case, it would imply that the turning point of the curve (*CEOage**) depends on a firm's performance relative to its industry (*dumROAind*), which would support the idea that performance framing moderates the inverted U-shaped relationship between CEO age and ESG engagement by shifting its turning point.

The results of this test are summarized at the bottom of Table 5 for the two possible values of the moderator (zero and 1). In all cases, we cannot reject the null hypothesis that Eq. (4) equals zero ($p > 0.10$). Consequently, turning point is not affected by each firm's performance framing relative to the industry median, such that Hypothesis 2 is not supported.

Additionally, we evaluate the moderating effect of performance framing by adopting a sample-split approach. Similar to prior works (e.g. Fuente et al., 2022), we estimate the baseline Eq. (1) for subsamples of industry outperformers and underperformers separately, and then assess whether the value of *CEOage* in the turning point of the curve for each subsample is statistically significantly different from that estimated in the baseline model for the full sample. Additionally, we perform analyses to examine whether there is a statistically significant difference between estimated extreme points between subsamples.[7] Table 6 reports these results. At the bottom of the table, *p*-values lead us not to reject the

[6] As proposed by Haans et al. (2016), we apply the *nlcom* command in STATA to conduct this test.

[7] We thank one of the anonymous reviewers for this suggestion.

Table 5
CEO career horizon (CEO age) and ESG engagement under different decision-framing scenarios: Interaction effects.

	Dependent variable: ESGscore		
	(1)	(2)	(3)
Constant	−9.6467***	−9.6434***	−9.6465***
	(1.1351)	(1.1377)	(1.1353)
CEOage	0.1063***	0.1034**	0.0994**
	(0.0402)	(0.0401)	(0.0401)
CEOage_sq	−0.0010***	−0.0010***	−0.0009**
	(0.0004)	(0.0004)	(0.0004)
Interaction effects			
CEOage × dumROA_indFF	−0.0037		
	(0.0065)		
CEOage_sq × dumROA_indFF	0.0001		
	(0.0001)		
CEOage × dumROA_ind2d		0.0013	
		(0.0064)	
CEOage_sq × dumROA_ind2d		−0.0000	
		(0.0001)	
CEOage × dumROA_indDIV			0.0064
			(0.0066)
CEOage_sq × dumROA_indDIV			−0.0001
			(0.0001)
Control variables			
ROA	0.6374*	0.7065**	0.2525
	(0.3563)	(0.3561)	(0.3603)
SIZE	0.7935***	0.7930***	0.7954***
	(0.0305)	(0.0305)	(0.0305)
LEV	−0.6965***	−0.6981***	−0.6903***
	(0.2399)	(0.2397)	(0.2392)
CASH	1.2141***	1.2202***	1.2053***
	(0.3289)	(0.3296)	(0.3274)
TANG	0.4638***	0.4649***	0.4704***
	(0.1287)	(0.1289)	(0.1289)
INVEST	−2.4367**	−2.4195**	−2.4661**
	(1.0449)	(1.0449)	(1.0472)
BOARDSIZE	0.4380***	0.4373***	0.4419***
	(0.1323)	(0.1326)	(0.1324)
BOARDINDEP	0.6394***	0.6416***	0.6403***
	(0.1697)	(0.1698)	(0.1697)
CEOduality	−0.2257***	−0.2253***	−0.2284***
	(0.0837)	(0.0837)	(0.0838)
INSOWN	0.2958	0.2950	0.3123
	(0.2231)	(0.2229)	(0.2235)
∑ linear effect	0.1026***	0.1047***	0.1058***
∑nonlinear effect	−0.0009***	−0.0009***	−0.0010***
Country fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
No. of obs.	7982	7982	7982
Pseudo R2	0.1528	0.1580	0.1577
∂ CEOage / ∂dumROA_ind if dumROA_ind = 0 [*p*-value]	2.3815 [0.332]	−0.2493 [0.934]	−0.2800 [0.932]
∂ CEOage / ∂dumROA_ind if dumROA_ind = 1 [p-value]	2.8151 [0.427]	−0.2407 [0.933]	−0.2448 [0.930]

This table shows the Tobit estimation results of Eq. (2). The dependent variable is a firm's ESG engagement, which is measured by the *ESGscore* (the average of the scores of the environmental, social, and governance pillars). CEO career horizon measure is *CEOage* (a firm's CEO age in years). A firm's performance relative to its industry peers is captured by three alternative proxies based on different industry classification schemes: *dumROA_indFF* (a dummy equal to one if a firm's ROA is above its 48-Fama-French industry median, and zero otherwise), *dumROA_ind2d* (a dummy equal to one if a firm's ROA is above its 2-digit SIC industry median, and zero otherwise), and *dumROA_indFF* (a dummy equal to one if a firm's ROA is above its U.S. division industry median, and zero otherwise). Control variables are: *ROA* (a firm's financial performance as return on assets), *SIZE* (a firm's size as the natural logarithm of the book value of total assets), *LEV* (leverage as the ratio of total debt to the book value of assets), *CASH* (cash reserves as the ratio of cash to the book value of assets), *TANG* (asset tangibility as the ratio of property, plant and equipment to the book value of assets), *INVEST* (investment opportunities as the ratio of CAPEX to the book value of assets), *BOARDSIZE* (the natural logarithm of the number of board directors), *BOARDINDEP* (the ratio of the number of independent directors to total board directors), *CEOduality* (a dummy variable equal to one if the CEO is also the board chair, zero otherwise), and *INSTOWN* (the percentage of shares held by institutional investors). All regressions control for country, year and industry fixed effects. ∑ *linear effect* tests the joint significance of the *CEOage* linear variable plus the interaction effect on the industry relative performance dummy. ∑ *non-linear effect* tests the joint significance of the *CEOage* squared variable plus the interaction effect on the industry relative performance dummy. At the bottom of the table, we test the null hypothesis that the derivative of the turning point with respect to the moderator is equal to zero. Standard errors are shown in parentheses under coefficients. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

null hypothesis that the turning point in each subsample is equal to that of the full sample of the baseline model. Furthermore, the turning points of the two subsamples exhibit no statistically significant difference between them. Again, this suggests there is no turning point shift in the two subsamples.

Finally, Fig. 3 graphically plots the estimated results of our baseline model (Eq. (1)). We estimate this model for the subsamples of the top 25th percentile industry performers and bottom 25th percentile industry performers separately. Although the curve for outperforming firms is slightly above that of the underperformers, the turning point is not seen to change significantly in the X-axis.

The lack of support for the moderating effect of performance framing could be explained by the intangible outcomes (e.g. legitimacy, trust) to emerge from ESG engagement. These outcomes do not occur in other risk-mitigating strategies such as corporate diversification. Such extra-benefits of ESG might not only lead to CEOs' risk appetite influencing a firm's ESG engagement but could also enhance their reputation, which in turn might translate into CEOs being held in greater esteem inside the company and thus being less likely to face dismissal (Shin, Lee, & Bansal, 2022), superior firm performance and access to wider future investment opportunities (Fuente et al., 2022). A firm's CEO reputation and legacy imprint are closely related to those outcomes (Kang, 2016), which could drive top managers' reluctance to allow their ESG engagement behaviour to be affected by performance targets. This explanation agrees with earlier literature suggesting the importance of ESG consistency being perceived as genuine by stakeholders (Wang & Choi, 2013).

4.4. Additional robustness analyses

We perform an additional battery of robustness analyses. First, we use an alternative proxy for CEO career horizon: CEO life horizon, calculated as the yearly life expectancy[8] in a firm's country minus CEO age. This is a direct proxy for CEO time-decision horizon, since we are taking their vital horizon as a threshold of the final point. Table A.2. of the Appendix reports these robustness checks. Overall, results remain similar to those previously described.

Second, we omit the governance pillar from ESG and repeat our analyses taking *ESaggregated* as the dependent variable. Alternatively, we also estimate our models by constructing an industry-adjusted ESG measure, following Hubbard, Christensen, and Graffin (2017). Third, we repeat the regressions to test Hypothesis 2 using one lag for the reference point measure of a firm's relative performance, since the latter's influence may take some time to influence a firm's decision-making. In addition, since CEO turnover might affect our findings, we conduct robustness analyses by dropping firm-year observations that have a CEO tenure below the five- and ten-year thresholds. We repeat the analyses without excluding firms with negative common equity. All of these explained checks provide robust results.[9]

[8] This data was obtained from the World Bank database.
[9] These results are available upon request.

Table 6
CEO age and ESG engagement under different decision-framing scenarios: robustness analyses by subsamples.

	Dependent variable: ESGscore					
	Above-median industry performance (dumROA_indFF = 1)	Below-median industry performance (dumROA_indFF = 0)	Above-median industry performance (dumROA_ind2d = 1)	Below-median industry performance (dumROA_ind2d = 0)	Above-median industry performance (dumROA_indDIV = 1)	Below-median industry performance (dumROA_indDIV = 0)
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	−10.2567***	−9.2660***	−10.1924***	−9.5550***	−10.4159***	−8.8376***
	(1.3871)	(1.4837)	(1.3184)	(1.5670)	(1.3445)	(1.4751)
CEOage	0.1031**	0.1046**	0.0999**	0.1178**	0.1092**	0.0916*
	(0.0476)	(0.0528)	(0.0451)	(0.0559)	(0.0463)	(0.0527)
CEOage_sq	−0.0010**	−0.0010**	−0.0009**	−0.0011**	−0.0010**	−0.0008*
	(0.0004)	(0.0005)	(0.0004)	(0.0005)	(0.0004)	(0.0005)
Control variables						
ROA	1.9195***	−0.1634	2.0771***	−0.1221	1.5523**	−0.5023
	(0.6604)	(0.4853)	(0.6559)	(0.4949)	(0.6645)	(0.5088)
SIZE	0.7883***	0.8163***	0.7931***	0.7999***	0.7956***	0.8040***
	(0.0385)	(0.0375)	(0.0377)	(0.0380)	(0.0390)	(0.0373)
LEV	−0.7505**	−0.5985**	−0.5718*	−0.8218***	−0.6288**	−0.7353**
	(0.3019)	(0.3042)	(0.2960)	(0.3060)	(0.3013)	(0.3067)
CASH	0.8220*	1.2230***	0.9541**	1.1205***	0.9865**	1.1026***
	(0.4357)	(0.4207)	(0.4305)	(0.4324)	(0.4351)	(0.4260)
TANG	−2.8195**	−2.5149*	−3.2074**	−1.9482	−3.4748***	−1.5975
	(1.2751)	(1.3398)	(1.2460)	(1.3337)	(1.2964)	(1.3099)
INVEST	0.5489***	0.4089**	0.5505***	0.4148**	0.6152***	0.3645**
	(0.1559)	(0.1589)	(0.1531)	(0.1615)	(0.1589)	(0.1538)
BOARDSIZE	0.6757***	0.1674	0.6454***	0.2348	0.7507***	0.0752
	(0.1649)	(0.1588)	(0.1632)	(0.1562)	(0.1671)	(0.1573)
BOARDINDEP	−0.1412	−0.3715***	−0.1624*	−0.3543***	−0.1188	−0.4313***
	(0.0988)	(0.1065)	(0.0970)	(0.1096)	(0.0988)	(0.1098)
CEOduality	0.7241***	0.5378***	0.7459***	0.5172**	0.6108***	0.7010***
	(0.2145)	(0.2077)	(0.2082)	(0.2177)	(0.2084)	(0.2148)
INSOWN	0.4761*	0.1348	0.4758*	0.1309	0.5235*	0.0353
	(0.2845)	(0.2536)	(0.2764)	(0.2642)	(0.2865)	(0.2649)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	4672	3310	4689	3293	4701	3281
Pseudo R2	0.1562	0.1677	0.1586	0.1645	0.1610	0.1648
Estimated extreme point	53.9908	52.4708	52.7556	54.3532	52.3318	55.2543
Equality of extreme value point between each subsample and full sample (p-value)	0.8804	0.7495	0.8149	0.7624	0.7023	0.6250
Equality of extreme value point between subsamples (p-value)	0.6270	0.6436	0.6247	0.5621	0.3471	0.4101

This table shows the Tobit estimation results of Eq. (1) by subsamples based on a firm's relative performance relative to its industry benchmark (proxied by *dumROA_indFF, dumROA_ind2d*, and *dumROA_indFF* depending on the industry classification scheme applied). The dependent variable is a firm's ESG engagement, which is measured by the *ESGscore* (the average of the scores of the environmental, social, and governance pillars). Control variables are: *ROA* (a firm's financial performance as return on assets), *SIZE* (a firm's size as the natural logarithm of the book value of total assets), *LEV* (leverage as the ratio of total debt to the book value of assets), *CASH* (cash reserves as the ratio of cash to the book value of assets), *TANG* (asset tangibility as the ratio of property, plant and equipment to the book value of assets), *INVEST* (investment opportunities as the ratio of CAPEX to the book value of assets), *BOARDSIZE* (the natural logarithm of the number of board directors), *BOARDINDEP* (the ratio of the number of independent directors to total board directors), *CEOduality* (a dummy variable equal to one if the CEO is also the board chair, zero otherwise), and *INSTOWN* (the percentage of shares held by institutional investors). All regressions control for country, year and industry fixed effects. At the bottom of the table, the estimated extreme point of the curvilinear relationship is reported, in addition to the *p*-values of the equality test of extreme points between each subsample and the full sample, and also the *p*-values of the equality test of extreme points between subsamples. Standard errors are shown in parentheses under coefficients. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Moreover, in order to alleviate potential omitted variable bias, we control for additional CEO characteristics which may also play a part in a firm's ESG engagement. Specifically, we add a binary variable which controls for whether a firm's CEO has financial expertise or not. We also account for CEOs' educational qualifications. We build a categorical variable which equals 1 to 3 based on whether the CEO holds a bachelor's degree, a master's degree, or a PhD, respectively. Table A.3. of the Appendix contains these robustness analyses. Column (1) corresponds with the regression to test Hypothesis 1, and columns (2) to (4) summarize the results of Hypothesis 2 based on different industry classification schemes to capture a firm's relative performance. Our evidence still holds after controlling for these additional CEO personal traits.[10]

Following recent research (Bernile, Bhagwat, & Rau, 2017; Chen & Xie, 2022; Lee, Trzcinka, & Venkatesan, 2019; Shu, Tan, & Wei, 2023; Wang & Qiu, 2023), we conduct a placebo test to examine whether our empirical findings are likely to have been obtained by a random factor or

[10] We thank an anonymous reviewer for this suggestion.

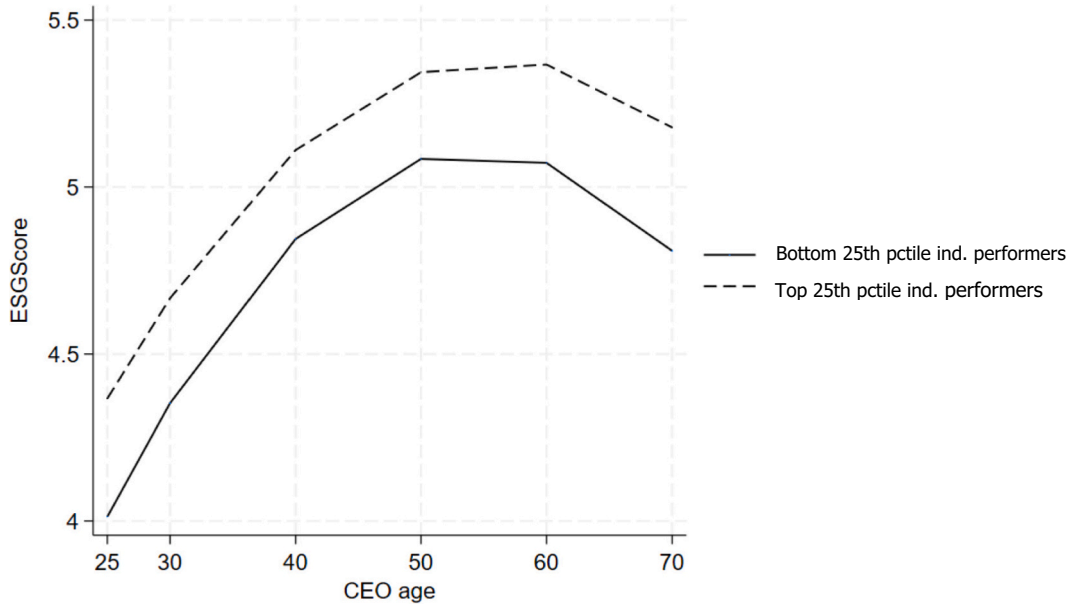

Fig. 3. CEO age and ESG engagement under different decision-framing scenarios: top 25th percentile and bottom 25th percentile industry performers.

endogeneity problems.[11] We re-test the impact of *CEOage* on ESG engagement by randomly shuffling the values of *CEOage* within each year to construct the variable labelled as *placebo_CEOage*. This shuffling process randomly assigns to each firm another firm's value from the set of observed CEO ages, thereby ensuring that the variables *CEOage* and *placebo_CEOage* display a similar distribution. A placebo test is passed when estimated coefficients from fake observations possess no statistical insignificance. We run placebo tests by re-estimating Eq. (1) replacing *CEOage* by *placebo_CEOage*. After 1000 regressions, re-estimated coefficients for the variable *placebo_CEOage* are lower than those for *CEOage*, and cannot be considered significantly different from zero. This is therefore indicative that our results are not spurious. Fig. 4 illustrates the placebo results for both the estimated coefficient (Panel A) and its corresponding t-statistic (Panel B).

Finally, to alleviate potential endogeneity concerns, we re-run our regressions by applying two-stage least square (2SLS) estimations. Table 7 reports these 2SLS estimations.[12] We instrument *CEOage* using the Consumer Price Index[13] in the year the CEO was born (*CPI*), its square term (*CPI_sq*), and the yearly total number of CEOs in a firm's industry and country who serve as directors on other boards different to that of the corresponding firm (*CEOotherboards*). CPI has been used as an instrument for CEO age in previous literature (Cline & Yore, 2016; Peltomäki, Sihvonen, Swidler, & Vähämaa, 2021; Serfling, 2014). Moreover, we expect the presence of CEOs serving on other boards to be indicative of greater expertise and therefore, that the CEOs are likely to be older. Column (1) reports the first-stage estimation results. Indeed, our results support that the three instruments are statistically significant. The more extensive the presence of CEOs on other boards within a firm's industry and country, the older a firm's CEO, a finding that ties in with our expectations. Column (2) presents the second-stage estimation results of the baseline model to test Hypothesis 1 (Eq. (1)). Columns (3) to (8) extend this model by including the interaction effects of a firm's relative performance based on different industry classification schemes. The Durbin-Wu-Hausman test does not lead to reject the null hypothesis of exogeneity of our explanatory variable *CEOage*, thereby ruling out the presence of endogeneity bias in our former Tobit estimation results ($p > 0.10$). As a consequence, the Tobit estimates prove to be more efficient when compared to 2SLS results (Wooldridge, 2019). Our evidence supports the relevance and validity of our instrumental variables, according to the Cragg-Donald-F-statistic and Sargan (1958) over-identification test, respectively. In any case, our empirical findings still hold after controlling for endogeneity.

5. Conclusion

We put the spotlight on two private benefits that a firm's ESG engagement may bring to their CEOs (reputation enhancement and reduction of risk exposure), which can lead ESG engagement to mirror such personal interests. Their prioritization by CEOs is expected to vary over the CEO's career horizon. This study investigates the relationship between CEO career horizon (as proxied by CEO age) and ESG engagement. We posit that CEO career horizon produces two opposite forces (career concerns and legacy concerns) which shape CEOs' efforts to engage in ESG. Combining these two forces results in a CEO's reputation appetite changing across their career stages, driving an inverted U-shaped relationship between CEO age and ESG engagement.

Our results provide supportive evidence for the influence of a CEO's reputation motive as a driver of ESG. In contrast, our evidence reveals that a CEO's private interest in curbing their perceived risk exposure plays no relevant role in their firm's ESG engagement. We find that the effect of CEO age on ESG engagement is not shaped by each firm's relative performance in comparison to its industry benchmark. Therefore, our results do not support the prospect theory's rationale that individuals' appetite for risk depends on their decisions performance framing. We attribute this result to the fact that ESG engagement is in some way different to other risk-mitigating strategies (e.g. diversification) because the former accrues a number of intangible outcomes for the firm and its top management team (e.g. reputational assets, stakeholder trust, investment opportunities) (Fuente et al., 2022; Kang, 2016; Lins et al., 2017). These contribute towards making managers being held in greater esteem inside the company and to reducing the likelihood of their being dismissed (Shin et al., 2022). Coupled with the importance of displaying a consistent ESG engagement in order to gain credibility in the eyes of stakeholders, these additional intangible outcomes from ESG might lead CEOs to shape additional ESG efforts depending on their risk

[11] We thank one anonymous reviewer for putting forward this robustness analysis.

[12] The sample size decreases in these estimations due to missing values in the instrumental variables.

[13] This data was collected from the World Bank database.

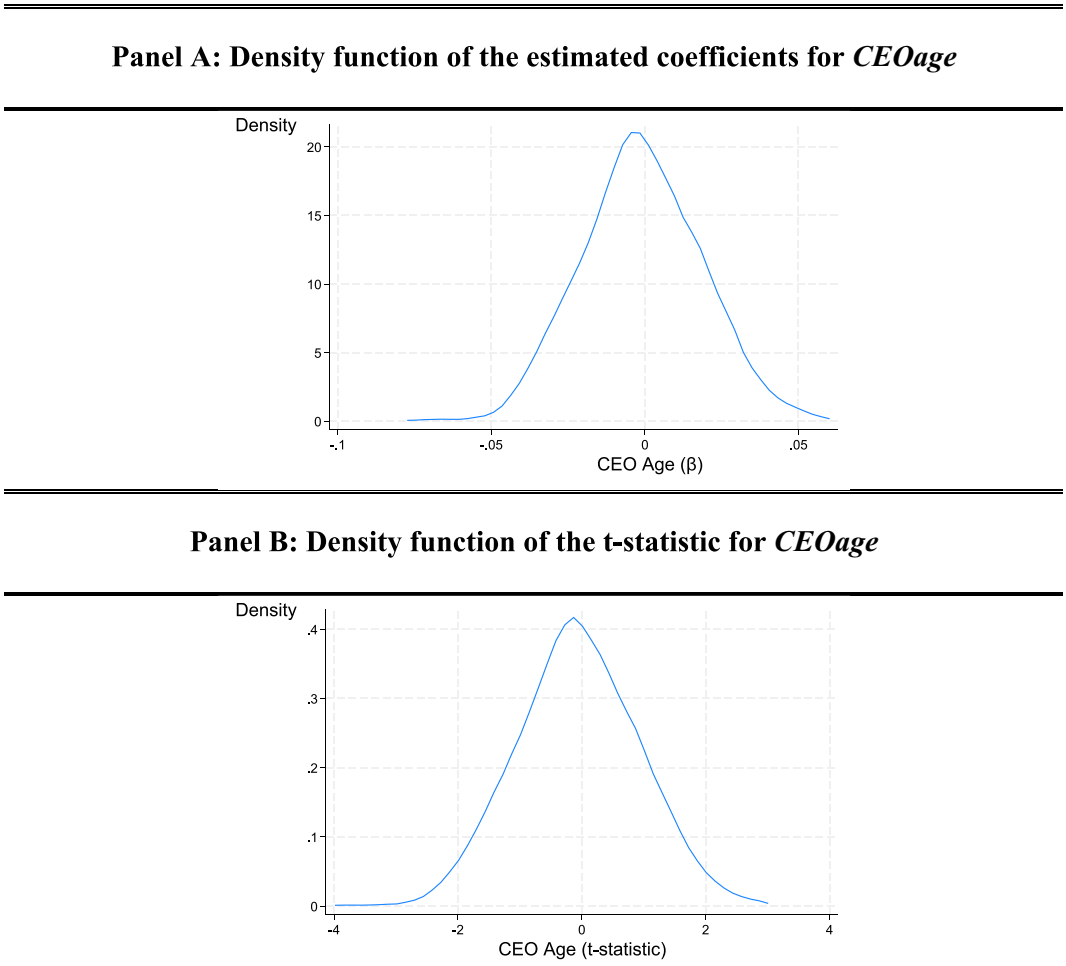

Fig. 4. Histogram distribution of regression coefficients from placebo tests.
This figure presents the probability density distribution of both the estimated coefficient (Panel A) and its corresponding t-statistic (Panel B) for the variable *placebo_CEOage*, as obtained by re-estimating Eq. (1) 1000 times, replacing the variable *CEOage* by *placebo_CEOage*. The horizontal axis represents the re-estimated coefficient (Panel A) and its t-statistic (Panel B), and the vertical axis corresponds to their frequency after 1000 estimations.

appetite throughout their career stages. In contrast, according to our evidence, they appear to be reluctant to make this decision contingent on the firm's performance framing.

5.1. Contributions

This article contributes to the literature in several ways. First, it broadens our understanding of the antecedents of a firm's engagement into ESG. So far, most existing literature has overfocused on a firm's consequences of adopting ESG actions (in particular, the effect of this strategy on a firm's value), downplaying the importance of why each might display a different degree of appetite for this strategy. Most research attributes the diversity of ESG involvement across companies to their different financial performance (financial resources), such that there has been a lack of any finer-grained analysis of the heterogeneous personal attributes of top decision-makers. In order to elucidate the sign of the relationship between ESG and a firm's value, it is essential to improve our knowledge about the antecedents of this strategy, such as top managers' motives for implementing it (Sajko et al., 2021). Prior works have already linked CEOs' risk-taking attitude to a firm's propensity to implement ESG, focusing on the direct impact of CEOs' personal traits such as gender, age, confidence or greed (Borghesi et al., 2014; McCarthy et al., 2017; Sajko et al., 2021). However, to the best of our knowledge, our study is the first to theorize and decompose the influence of a CEO's career horizon into two underlying mechanisms (career concerns and legacy concerns) and to test their interplay in a curvilinear relationship using arguments based on the private benefits which CEOs are able to extract from corporate ESG engagement (stronger personal reputation and weaker perceived exposure to risk). Such a framework of analysis helps bring this strategy and stakeholders' personal motivations closer together.

Second, this study expands the prospect theory rationale regarding the influence of decision framing on strategic decisions by theorizing and testing it on top decision-makers' behaviour in the particular domain of ESG. Earlier studies such as Holmes et al. (2011) underscore the importance of developing a more precise knowledge of the origins and influence of the reference points. While previous research has confirmed the prospect theory premises for other insurance strategies such as corporate diversification (Hutzschenreuter et al., 2014), whether this also applies to ESG is a question which deserves further inquiry. Interestingly, we find that prospect theory predictions to the effect that individuals' appetite for risk will change depending on the decision framing do not occur in the context of ESG engagement. In contrast to other insurance strategies, ESG requires credibility if it is to work. Should companies truly believe in the “doing well by doing good” paradigm, then they will engage in this strategy in a consistent manner. This might help them to safeguard its accumulated legitimacy from ESG and prevent its ESG actions from being sensitive to decision framing.

Table 7
Robustness analyses controlling for endogeneity: Two-stage least squares (2SLS) estimations.

	Dependent variable: CEOage	Dependent variable: ESGscore			
	(1)	(2)	(3)	(4)	(5)
Constant	51.1885***	−14.0717***	−14.4185***	−14.3616***	−14.5280***
	(0.7660)	(3.1612)	(3.0962)	(3.0988)	(3.0997)
CPI	−1.5306***				
	(0.0457)				
CPI_sq	0.0676***				
	(0.0027)				
CEOotherboards	0.1128***				
	(0.0220)				
CEOage		0.2602**	0.2674**	0.2620**	0.2679**
		(0.1244)	(0.1222)	(0.1235)	(0.1223)
CEOage_sq		−0.0023*	−0.0024**	−0.0023*	−0.0024**
		(0.0012)	(0.0012)	(0.0012)	(0.0012)
Interaction effects					
CEOage × dumROA_indFF			0.0104		
			(0.0146)		
CEOage_sq × dumROA_indFF			−0.0002		
			(0.0003)		
CEOage × dumROA_ind2d				0.0166	
				(0.0143)	
CEOage_sq × dumROA_ind2d				−0.0003	
				(0.0003)	
CEOage × dumROA_indDIV					0.0166
					(0.0148)
CEOage_sq × dumROA_indDIV					−0.0003
					(0.0003)
Control variables					
ROA	−1.2904*	0.7973***	0.6158**	0.6637***	0.2963
	(0.7341)	(0.2112)	(0.2534)	(0.2526)	(0.2573)
SIZE	0.4315***	0.7961***	0.7969***	0.7964***	0.7989***
	(0.0535)	(0.0157)	(0.0158)	(0.0158)	(0.0158)
LEV	−0.5829	−0.7391***	−0.7419***	−0.7420***	−0.7372***
	(0.4156)	(0.1197)	(0.1200)	(0.1198)	(0.1199)
CASH	−0.8742	1.2416***	1.2316***	1.2322***	1.2228***
	(0.7193)	(0.2070)	(0.2074)	(0.2074)	(0.2071)
TANG	−8.3825***	−1.8924***	−1.8762***	−1.9035***	−1.9520***
	(2.0653)	(0.5986)	(0.6034)	(0.5982)	(0.5996)
INVEST	0.7269***	0.3963***	0.3943***	0.3956***	0.4039***
	(0.2125)	(0.0613)	(0.0614)	(0.0613)	(0.0612)
BOARDSIZE	0.3365	0.4101***	0.4128***	0.4146***	0.4161***
	(0.2235)	(0.0646)	(0.0647)	(0.0647)	(0.0647)
BOARDINDEP	0.0862	−0.1933***	−0.1925***	−0.1907***	−0.1938***
	(0.1629)	(0.0471)	(0.0470)	(0.0470)	(0.0470)
CEOduality	0.3425	0.6665***	0.6724***	0.6745***	0.6729***
	(0.3285)	(0.0947)	(0.0955)	(0.0953)	(0.0957)
INSOWN	0.9680**	0.2867**	0.2934**	0.2912**	0.3086**
	(0.4231)	(0.1218)	(0.1218)	(0.1219)	(0.1218)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
No. of obs.	6787	6787	6787	6787	6787
F-statistic	–	127.61***	122.68***	122.61***	123.05***
Weak identification test (Cragg-Donald statistic)	–	210.359	201.993	196.326	200.799
Sargan overidentification test (p-value)	–	0.379	0.5656	0.6313	0.5769
Durbin-Wu-Hausman test (p-value)	–	0.1984	0.1756	0.1726	0.2144
∂ CEOage / ∂dumROA_ind if dumROA_ind = 0 [p-value]	–	–	−2.0113 [0.621]	−3.9004 [0.465]	−2.6995 [0.546]
∂ CEOage / ∂dumROA_ind if dumROA_ind = 1 [p-value]	–	–	−1.7427 [0.575]	−3.0477 [0.360]	−2.1933 [0.476]

This table shows two-stage least squares (2SLS) estimation results of Eqs. (1) and (2). The dependent variable is a firm's ESG engagement, which is measured by the *ESGscore* (the average of the scores of the environmental, social, and governance pillars). Our proxy for CEO career horizon is *CEOage* (a firm's CEO age in years). This latter variable is instrumented using *CPI* (the Consumer Price Index in the year the CEO was born), *CPI_sq* (the square of term of *CPI*), and *CEOotherboards* (the yearly total number of CEOs in a firm's industry within its country who serve as directors on other boards different to that of their corresponding firm). A firm's performance relative to its industry peers is captured by three alternative proxies based on different industry classification schemes: *dumROA_indFF* (a dummy equal to one if a firm's ROA is above its 48-Fama-French industry median, and zero otherwise), *dumROA_ind2d* (a dummy equal to one if a firm's ROA is above its 2-digit SIC industry median, and zero otherwise), and *dumROA_indFF* (a dummy equal to one if a firm's ROA is above its U.S. division industry median, and zero otherwise). Control variables are: *ROA* (a firm's financial performance as return on assets), *SIZE* (a firm's size as the natural logarithm of the book value of total assets), *LEV* (leverage as the ratio of total debt to the book value of assets), *CASH* (cash reserves as the ratio of cash to the book value of assets), *TANG* (asset tangibility as the ratio of property, plant and equipment to the book value of assets), *INVEST* (investment opportunities as the ratio of CAPEX to the book value of assets), *BOARDSIZE* (the natural logarithm of the number of board directors), *BOARDINDEP* (the ratio of the number of independent directors to total board directors), *CEOduality* (a dummy variable equal to one if the

CEO is also the board chair, zero otherwise), and *INSTOWN* (the percentage of shares held by institutional investors). All regressions control for country, year and industry fixed effects. The Cragg-Donald F-statistic evaluates instrument relevance. The Sargan test of overidentifying restrictions evaluates instrument validity. The Durbin-Wu-Hausman statistic tests for exogeneity of *CEOage*. At the bottom of the table, we test the null hypothesis that the derivative of the turning point with respect to the moderator is equal to zero. Standard errors are shown in parentheses under coefficients. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

5.2. Directions for future research

This investigation opens up a number of avenues in the future research agenda. First, additional efforts could seek to provide insights into the influence of CEO risk attitude in irresponsible corporate behaviour. Recent research has highlighted the distinction between socially responsible and socially irresponsible behaviour (Fu et al., 2020; O'Sullivan et al., 2021; Shin et al., 2022). This might have an asymmetrical impact on a firm's performance and would thus benefit from further study, both individually and jointly in order to gain a more accurate assessment of the outcomes to emerge from this strategy. Second, it is interesting to explore managers' personal traits related to their biographical background (O'Sullivan et al., 2021), which can play a part in their degree of involvement in responsible practices. It would also be interesting to account for differences in culture across countries since society's values may also influence CEO's willingness to promote ESG actions.

Moreover, additional members of the top management team other than the CEO should also be considered (e.g. chief financial officer, chief sustainability officer) (Fu et al., 2020). Most likely, this will involve collecting primary data by conducting surveys and personal interviews with a large sample of top managers. Complementarily, another open question that remains is how top managers' compensation packages might alter their risk appetite along their career stages and across the different performance frames in which they decide on additional ESG efforts. Future work should take into account the role of both explicit compensation incentives (from compensation contract) and implicit compensation incentives (from career concerns). Third, we would encourage future researchers to delve into the population of CEOs at the extreme points of their career horizon; namely, newly appointed CEOs and near-retirement CEOs, and how ESG engagement is influenced by their entering and leaving office, respectively. In this regard, the method of CEO succession might be of particular interest (Krause & Semadeni, 2014).

Declaration of competing interest

None.

Data availability

No

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Appendix A. Appendix

Table A.1
Variable description.

Variable	Description	Source	Label
Dependent variable			
ESG engagement	Overall ESG score, as the average of the scores of the three pillars (environmental, social, and governance).	Refinitiv	ESGscore
	Overall ESG score, as the average of the scores of the two pillars (environmental and social).	Refinitiv	ESscore
Explanatory variable			
CEO career horizon	Age (years) of a firm's CEO. It is an inverse proxy for CEO career horizon such that the older the CEO, the shorter their career horizon.	NRG Metrics	CEOage
Performance dummies			
Firm performance relative to its industry peers	Dummy variable which equals one if a firm's return on assets is above its 48-Fama-French industry median; zero otherwise.	Worldscope	dumROA_indFF
	Dummy variable which equals one if a firm's return on assets is above its 2-digit SIC industry median; zero otherwise.	Worldscope	dumROA_ind2d
	Dummy variable which equals one if a firm's return on assets is above its U.S. division industry median; zero otherwise.	Worldscope	dumROA_indDIV
Control variables			
Firm financial performance	Return on assets.	Worldscope	ROA
Firm size	The natural logarithm of the book value of total assets.	Worldscope	SIZE
Firm leverage	The ratio of total debt divided by the book value of assets.	Worldscope	LEV
Firm cash reserves	The ratio of cash to the book value of assets.	Worldscope	CASH
Firm asset tangibility	The ratio of property, plant and equipment to the book value of assets.	Worldscope	TANG
Firm investment opportunities	The ratio of CAPEX to the book value of assets.	Worldscope	INVEST
Board size	Natural logarithm of the number of board directors.	NRG Metrics	BOARDSIZE

(*continued on next page*)

Table A.1 (*continued*)

Variable	Description	Source	Label
Board independence	The ratio of the number of independent directors divided by total board directors.	NRG Metrics	BOARDINDEP
CEOduality	Dummy variable which equals one if the CEO is also the board chair; zero otherwise.	NRG Metrics	CEOduality
Institutional ownership	The percentage of shares held by institutional investors.	NRG Metrics	INSTOWN

Table A.2
CEO life horizon and ESG engagement: Robustness analyses.

	Dependent variable: ESGscore			
	(1)	(2)	(3)	(4)
Constant	−8.0573***	−8.0651***	−8.0616***	−8.0813***
	(0.5022)	(0.5037)	(0.5028)	(0.5044)
Lifehorizon	0.0578***	0.0528**	0.0569**	0.0517**
	(0.0213)	(0.0217)	(0.0221)	(0.0217)
Lifehorizon_sq	−0.0011**	−0.0009**	−0.0011**	−0.0010**
	(0.0004)	(0.0004)	(0.0004)	(0.0004)
Interaction effects				
Lifehorizon × dumROA_indFF		0.0081		
		(0.0102)		
Lifehorizon_sq × dumROA_indFF		−0.0002		
		(0.0003)		
Lifehorizon × dumROA_ind2d			0.0014	
			(0.0096)	
Lifehorizon_sq × dumROA_ind2d			0.0000	
			(0.0003)	
Lifehorizon × dumROA_indDIV				0.0101
				(0.0102)
Lifehorizon_sq × dumROA_indDIV				−0.0001
				(0.0003)
Control variables				
ROA	0.7790**	0.5569	0.6313	0.2457
	(0.3789)	(0.4087)	(0.4120)	(0.4154)
SIZE	0.7963***	0.7981***	0.7968***	0.7996***
	(0.0349)	(0.0349)	(0.0349)	(0.0350)
LEV	−0.8783***	−0.8709***	−0.8740***	−0.8595***
	(0.2785)	(0.2792)	(0.2787)	(0.2783)
CASH	1.4820***	1.4639***	1.4714***	1.4467***
	(0.3671)	(0.3664)	(0.3672)	(0.3650)
TANG	0.6044***	0.6029***	0.6042***	0.6149***
	(0.1505)	(0.1507)	(0.1507)	(0.1504)
INVEST	−2.5473**	−2.5701**	−2.5696**	−2.6543**
	(1.2380)	(1.2397)	(1.2373)	(1.2425)
BOARDSIZE	0.4331***	0.4333***	0.4347***	0.4359***
	(0.1459)	(0.1457)	(0.1458)	(0.1458)
BOARDINDEP	0.5787***	0.5769***	0.5792***	0.5796***
	(0.1795)	(0.1791)	(0.1793)	(0.1790)
CEOduality	−0.1791*	−0.1800*	−0.1802*	−0.1831*
	(0.0954)	(0.0953)	(0.0953)	(0.0954)
INSOWN	0.3617	0.3615	0.3637	0.3724
	(0.2760)	(0.2763)	(0.2762)	(0.2770)
∑ linear effect	–	0.0609***	0.0583***	0.0618***
∑nonlinear effect	–	−0.0011**	−0.0010**	−0.0011**
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
No. of obs.	5976	5976	5976	5976
Pseudo R2	0.1524	0.1525	0.1525	0.1529
∂ Lifehorizon / ∂dumROA_ind if dumROA_ind = 0	–	−1.4624	0.8732	1.1208
[p-value]		[0.791]	[0.802]	[0.798]
∂ Lifehorizon / ∂dumROA_ind if dumROA_ind = 1	–	−1.0054	0.8862	0.8420
[p-value]		[0.751]	[0.826]	[0.824]

This table shows robustness analyses for the Tobit estimation results of Eqs. (1) and (2). The dependent variable is a firm's ESG engagement, which is measured by the *ESGscore* (the average of the scores of the environmental, social, and governance pillars). Our alternative proxy for CEO time horizon is *Lifehorizon* (yearly life expectancy in a firm's country minus CEO age in years). A firm's performance relative to its industry peers is captured by three alternative proxies based on different industry classification schemes: *dumROA_indFF* (a dummy equal to one if a firm's ROA is above its 48-Fama-French industry median, and zero otherwise), *dumROA_ind2d* (a dummy equal to one if a firm's ROA is above its 2-digit SIC industry median, and zero otherwise), and *dumROA_indDIV* (a dummy equal to one if a firm's ROA is above its U.S. division industry median, and zero otherwise). Control variables are: *ROA* (a firm's financial performance as return on assets), *SIZE* (a firm's size as

the natural logarithm of the book value of total assets), *LEV* (leverage as the ratio of total debt to the book value of assets), *CASH* (cash reserves as the ratio of cash to the book value of assets), *TANG* (asset tangibility as the ratio of property, plant and equipment to the book value of assets), *INVEST* (investment opportunities as the ratio of CAPEX to the book value of assets), *BOARDSIZE* (the natural logarithm of the number of board directors), *BOARDINDEP* (the ratio of the number of independent directors to total board directors), *CEOduality* (a dummy variable equal to one if the CEO is also the board chair, zero otherwise), and *INSTOWN* (the percentage of shares held by institutional investors). All regressions control for country, year and industry fixed effects. $\sum$ *linear effect* tests the joint significance of the *Lifehorizon* linear variable plus the interaction effect on the industry relative performance dummy. $\sum$ *non-linear effect* tests the joint significance of the *Lifehorizon* squared variable plus the interaction effect on the industry relative performance dummy. At the bottom of the table, we test the null hypothesis that the derivative of the turning point with respect to the moderator is equal to zero. Standard errors are shown in parentheses under coefficients. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Table A.3
Robustness analyses controlling for other CEO personal traits.

	Dependent variable: ESGscore			
	(1)	(2)	(3)	(4)
Constant	−9.1854***	−9.1820***	−9.2194***	−9.2126***
	(1.2063)	(1.2064)	(1.2087)	(1.2062)
CEOage	0.0984**	0.1010**	0.1013**	0.0961**
	(0.0416)	(0.0422)	(0.0421)	(0.0422)
CEOage_sq	−0.0009**	−0.0010***	−0.0010***	−0.0009**
	(0.0004)	(0.0004)	(0.0004)	(0.0004)
Interaction effects				
CEOage × dumROA_indFF		−0.0049		
		(0.0068)		
CEOage_sq × dumROA_indFF		0.0001		
		(0.0001)		
CEOage × dumROA_ind2d			−0.0027	
			(0.0067)	
CEOage_sq × dumROA_ind2d			0.0001	
			(0.0001)	
CEOage × dumROA_indDIV				0.0035
				(0.0068)
CEOage_sq × dumROA_indDIV				−0.0000
				(0.0001)
Control variables				
ROA	0.7139**	0.5334	0.6180	0.1983
	(0.3496)	(0.3812)	(0.3837)	(0.3850)
SIZE	0.7823***	0.7830***	0.7828***	0.7850***
	(0.0329)	(0.0329)	(0.0329)	(0.0329)
LEV	−0.6049**	−0.6010**	−0.6047**	−0.5968**
	(0.2568)	(0.2568)	(0.2567)	(0.2560)
CASH	1.3093***	1.2961***	1.3029***	1.2911***
	(0.3621)	(0.3610)	(0.3620)	(0.3591)
TANG	0.4107***	0.4083***	0.4083***	0.4134***
	(0.1338)	(0.1337)	(0.1338)	(0.1338)
INVEST	−2.6370**	−2.6711**	−2.6453**	−2.6795**
	(1.1426)	(1.1415)	(1.1419)	(1.1450)
BOARDSIZE	0.5206***	0.5230***	0.5220***	0.5263***
	(0.1371)	(0.1368)	(0.1370)	(0.1369)
BOARDINDEP	0.5663***	0.5638***	0.5632***	0.5632***
	(0.1754)	(0.1753)	(0.1754)	(0.1753)
CEOduality	−0.2117**	−0.2132**	−0.2139**	−0.2159**
	(0.0891)	(0.0889)	(0.0888)	(0.0890)
INSOWN	0.4696*	0.4712*	0.4732*	0.4910**
	(0.2459)	(0.2466)	(0.2463)	(0.2465)
FINEXPERTISE	−0.2759	−0.2730	−0.2750	−0.2725
	(0.1735)	(0.1732)	(0.1732)	(0.1722)
EDUCATION	0.0058	0.0052	0.0054	0.0029
	(0.0625)	(0.0624)	(0.0624)	(0.0621)
$\sum$ linear effect	–	0.0960**	0.0985**	0.0996**
$\sum$nonlinear effect	–	−0.0008**	0.0009**	−0.0009**
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
No. of obs.	6835	6835	6835	6835
Pseudo R2	0.1635	0.1637	0.1636	0.1639
∂ CEOage / ∂dumROA_ind if dumROA_ind = 0	–	3.0656	1.7622	1.0696
[p-value]		[0.221]	[0.507]	[0.725]
∂ CEOage / ∂dumROA_ind if dumROA_ind = 1	–	3.8550	1.9973	1.0365
[p-value]		[0.350]	[0.568]	[0.746]

This table shows robustness analyses for the Tobit estimation results of Eqs. (1) and (2). The dependent variable is a firm's ESG engagement, which is measured by the *ESGscore* (the average of the scores of the environmental, social, and governance pillars). Our proxy for CEO career horizon is *CEOage* (CEO age in years). Control variables are: *ROA* (a firm's financial performance as return on assets), *SIZE* (a firm's size as the natural logarithm of the book value of total assets), *LEV*

(leverage as the ratio of total debt to the book value of assets), *CASH* (cash reserves as the ratio of cash to the book value of assets), *TANG* (asset tangibility as the ratio of property, plant and equipment to the book value of assets), *INVEST* (investment opportunities as the ratio of CAPEX to the book value of assets), *BOARDSIZE* (the natural logarithm of the number of board directors), *BOARDINDEP* (the ratio of the number of independent directors to total board directors), *CEOduality* (a dummy variable equal to one if the CEO is also the board chair, zero otherwise), *INSTOWN* (the percentage of shares held by institutional investors), *FINEXPERTISE* (a dummy variable equal to one if the CEO has financial expertise, and zero otherwise), and *EDUCATION* (a categorical variable which equals one if the CEO holds a bachelor's degree, two if they hold a master's degree, three if they hold a PhD, and zero if the CEO has no degree). All regressions control for country, year and industry fixed effects. $\sum$ *linear effect* tests the joint significance of the *CEOage* linear variable plus the interaction effect on the industry relative performance dummy. $\sum$ *non-linear effect* tests the joint significance of the *CEOage* squared variable plus the interaction effect on the industry relative performance dummy. At the bottom of the table, we test the null hypothesis that the derivative of the turning point with respect to the moderator is equal to zero. Standard errors are shown in parentheses under coefficients. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

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