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# Do CEO career dynamics matter in environmental management? New evidence from the United Kingdom

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## Abstract

This study examines the impact of CEO career dynamics (including CEO tenure, CEO horizon and CEO seasons) on environmental management within the UK context. Unlike the previous studies that have primarily focused on corporate social performance, we instead examine these relations within the environmental management context. We posit and detect that CEO tenure has a positive non-linear association with environmental management, indicating that CEOs' interest in environmental issues diminishes over time. We also provide evidence that CEO horizon has a positive impact on environmental management. Finally, as regards CEO seasons, we provide limited support that CEOs in their 'convergence', and 'Response to mandate and experimentation' stages are associated with environmental management. These results hold important implications for both firms and policymakers in the United Kingdom.

## KEYWORDS

CEO horizon, CEO seasons, CEO tenure, corporate governance, environmental management, UK

## INTRODUCTION

Senior management in firms are committed to implement policies and practices that draw on the firm's resources in order to achieve strategic goals (Endo, 2020). This, consequently, achieves financial and nonfinancial gains (Shahab et al., 2020) in addition to strengthening the environmental legitimacy (Alrazi et al., 2015) that firms gain from following sound environmental regulations and policies. Several research studies have shown that the presence of environmental management policies and practices is not sufficient to improve firm's performance unless senior management, and more precisely the CEO, has a fundamental role in enacting those policies and practices (Galbreath, 2017; García Martín & Herrero, 2020). Drawing on the upper echelons theory, we realise that effective leadership of senior management in the firm is key to firm performance and growth (Hambrick & Mason, 1984). Thus, observable characteristics of senior management (e.g., age, tenure and seasons) are crucial to the alignment of firm's resources and

activities to achieve competitive advantage through environmental performance (Kilincarslan et al., 2020; Nguyen et al., 2021). Investors, creditors and other stakeholders are more than ever concerned with how firm CEO is aligned (or the lack thereof) to environmental challenges as this might be a proxy measure of how the firm responds to risks and opportunities (Oware & Awunyo-Vitor, 2021; Rao & Tilt, 2016). That said, the main role of CEOs, within the perspective of upper echelon, in utilising environmental management principles to meet environmental challenges cannot be overlooked (Hardcopf et al., 2021).

The majority of studies that focus on CEO characteristics seem to have focused more on CEO power (Muttakin et al., 2018; Sariol & Abebe, 2017), compensations (Harris et al., 2019; Stanwick & Stanwick, 2001) and duality (Duru et al., 2016), which leaves other characteristics (such as CEO tenure, CEO horizon and CEO seasons) underexplored. (Bromiley & Rau, 2016) conducted a systematic literature review on upper echelons theory and suggested that upper echelons seem to have

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been used extensively in studying the impact of CEO tenure, CEO career horizons and CEO seasons on firm financial performance such as profitability and growth compared with the scarce use of the theory to study environment management.

Although different studies have shown that CEO tenure impacts firm profitability or overall performance (Simsek, 2007), it is until recently that research on CEO characteristics, and more precisely CEO tenure, in environmental performance has gained prominent attention (e.g. Chen et al., 2019). We recognise that research on CEO tenure draws mainly on the accumulation of experience and therefore the ability of the CEO to make strategic decisions. On the other hand, the CEO career horizon draws on the motivations and expectations of the CEO with regard, for example, to financial gains and promotion. However, we find no major study investigating the influence of CEO tenure, CEO horizon and CEO seasons in the environmental context within the United Kingdom, and hence, we bridge this gap by examining how CEO tenure and CEO horizon influence firm's environmental management. The significance of bridging the gap by studying these specific CEO characteristics (i.e., tenure and horizon) is both theoretical and empirical as follows: first, several authors argued that research on environmental management with relation to corporate governance is skewed towards studying the impact of board structure on firm environmental management (De Villiers et al., 2011; Elmagrhi et al., 2019; Nguyen et al., 2021; Orazalin, 2020). Guided by the upper echelons theory, we posit that CEO career dynamics are equally significant in understanding firm's environmental management because those characteristics are a reflection of CEO orientations, actions and biases and as such will have implications on how the firm manages the environmental agenda. Second, extant literature maintains that strategic decisions made by CEOs change with CEO's tenure (e.g., Cirillo et al., 2021; Godos-Díez et al., 2020; McClelland et al., 2012; Romano et al., 2019; Simsek, 2007). In our study, we stress on this fact and add to this line of inquiry the importance of CEO horizons in determining strategic decision, such as environmental-related issues. In so doing, our study highlights the importance of differentiating between CEO tenure and career horizon and the effect that both will have on environmental management. Third, our study empirically examines both the monotonic and the nonmonotonic effects of CEO tenure and horizons (i.e., the nonlinear relationship between CEO tenure and environmental management as well as the different categories of CEO horizons) on environmental management, and as a further check, we empirically explored the possible impact of different CEO generations on environmental management. Fourth, our paper might have a future potential policy implication, as the United Kingdom is still transitioning post-Brexit, legislations are being reviewed at all levels. The impact of Brexit on corporate

governance and structural changes in firms operating in the United Kingdom is unfolding. An example of such changes is the impact of the generational segmentation in board structures and following the re-location of several CEOs to EU firms. Although we have not empirically examined this, we open this debate for future research. Fifth, our study empirically examines the effect of CEO seasons on environmental management within the UK context. This dimension will enhance our understanding of how CEO career dynamics might impact strategic decisions such as those related to the environment. Sixth and finally, the UK boasts a strong record on sustainability reporting. Consequently, regulators, legislators, directors and boards are interested to know the impact of CEO tenure, horizons and seasons on the environmental management.

Pertinent to the gap identified and the significance of tackling the research gap, this paper raises this research question: *How does CEO career dynamics (CEO tenure, CEO career horizon and CEO seasons) impact environmental management in the company?* We build theoretical arguments that the environmental management will differ in accordance with CEO's tenure, career horizon and seasons. Thus, our study offers the following contributions. First, our study is the first major study to consider the impact of CEO tenure, CEO horizon and CEO seasons on environmental management within the UK context. This will bolster research on environmental management in the UK context by offering theoretical and empirical contributions of how CEO dynamics impact environmental management in UK firms. Second, unlike previous studies that investigated CEO characteristics within corporate social responsibility's context, this paper explores this association within environmental context and provide two proxies for environmental management (please see [Variables definitions](#) section for details). Third, by detailing the three dimensions of CEO's career dynamics (tenure, horizons and seasons), our contribution is to inform researchers and practitioners alike of the significance of considering these dimensions in understanding how/why environmental management is informed by the variations of these dimensions. Fourth and finally, our contribution is to inform practitioners and policymakers on the various aspects of environmental management (successes, failures, challenges, etc.) that might have been oversimplified due to discounting CEO career into one dimension and that one way to pay attention to these aspects is through viewing CEO's career as variations of tenure, horizons and seasons.

Our findings indicate a nonlinear, inverted U-shaped relationship between CEO tenure and environmental management. This suggests that CEOs are actively involved in environmental activities at the beginning of their careers. Furthermore, we find a positive association between CEO horizon (time until retirement) and environmental management, indicating that CEOs with more time until retirement exhibit greater enthusiasm towards

environmental initiatives. Moreover, we report limited evidence supporting the influence of CEO seasons on environmental management, and our analysis did not reveal any significant impact of CEO generations on environmental management. Regarding corporate governance factors, we detect that companies with smaller boards that appoint independent directors are more actively engaged in environmental activities. Lastly, institutional investors perceive environmental practices as nonvalue added, leading to reduced interest in environmental activities.

The remaining of this paper is structured as follows: Section 2 covers the theoretical background and hypotheses development; Section 3 demonstrates data and methodology; Section 4 presents the results of the empirical models; and finally, Section 5 concludes this paper.

## THEORETICAL BACKGROUND

Our study is grounded on a theoretical framework of the upper echelons theory to explain key trends in the theoretical stand of the environmental management and CEO career dynamics. Our theoretical commitment, central to Hambrick & Mason's (1984) model, adopts the upper echelons theory which sits on three tenets. Firstly, the theory posits that strategic decisions and corporate policies and actions are determined by senior management's (e.g. CEO) demographics; such as observable characteristics of (for example, age, gender, origin, succession, and experience), background attributes and cognitive bases (Cabeza-García et al., 2018; Chen et al., 2019; Hong et al., 2019; Shahab et al., 2020). Secondly, the theory problematises the underlying characteristics of senior management (e.g. personality, narcissism, overconfidence, and hubris) and examines their relationships with firm performance (Al-Shammari et al., 2019; Chithambo et al., 2020). Lastly, the theory argues that internal and external power relationships, social ties and interactions of senior management influenced by both observable and underlying characteristics impact firm's performance (García Martín & Herrero, 2020; García-Sánchez & Martínez-Ferrero, 2019; Shahab et al., 2020).

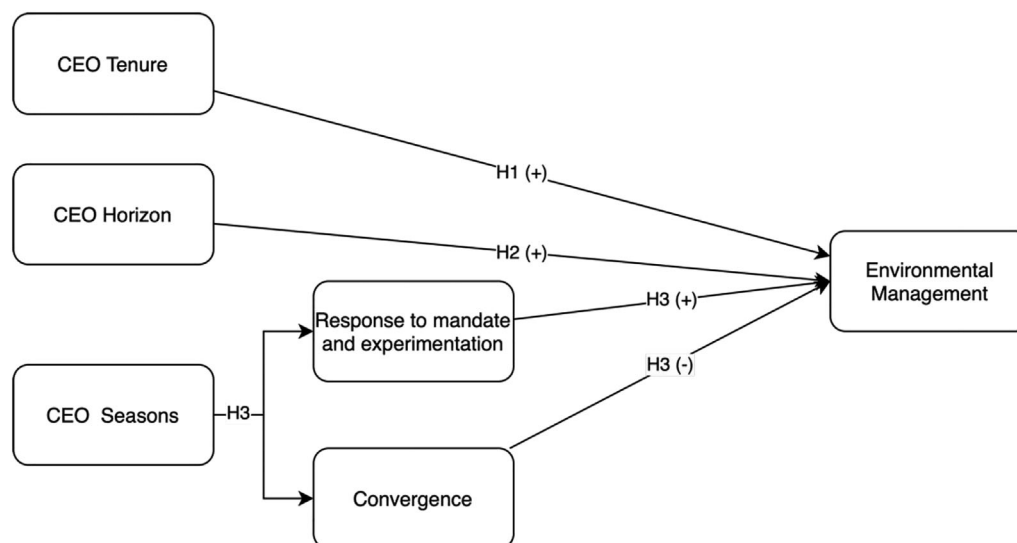
We draw on upper echelons theory to illustrate how environmental management is driven by 'the tone at the top' that is manifested in CEO's preferences, choices, decisions and styles (Bhandari & Golden, 2021; Hambrick & Fukutomi, 1991; Hambrick & Mason, 1984). Upper Echelons is a strong theoretical lens that lends its power of predictability of organisational outcomes (e.g. environmental record) to scholars and practitioners alike (Hambrick & Mason, 1984). Scholars operationalise the theory on strategic management teams to predict, say, environmental management, cost strategies and sustainability reporting. On the other hand, practitioners make use of the theory in the selection of top management based on their level of education, level of expertise and longevity

of their service in the firm's economic activity (Hambrick & Mason, 1984). A key premise of the theory is that CEOs make strategic decisions and steer strategic directions drawing on their personal lenses that are a mix of cognitive values and observable characteristics such as age tenure and education (Hambrick & Mason, 1984; Heavey & Simsek, 2015; Shahab et al., 2020). Pertinent to that premise, we posit that CEO's tenure, career horizons and seasons have stronger influence on making decisions related to the environmental agenda of the firm (Chen et al., 2019; Post et al., 2015; Simsek, 2007). That said, those characteristics may result in interpretation and attribution challenges in the board (e.g., investment in long-term versus short-term environmental initiatives), particularly with those of diverging interests, that may potentially impact the quality of the decisions in environmental management (Li et al., 2019). Despite the research that reported the impact of CEO career on strategic management in companies (Heyden et al., 2017), there are few research studies on its impact on environmental management (Elmagrhi et al., 2019; Oh et al., 2016; Shahab et al., 2020). Therefore, a new line of inquiry seems to benefit from the study of CEO career on environmental management of CEOs. In this line of inquiry, we implement a study of CEO tenure, career horizons and CEO seasons and their impact on CEO's environmental management. We illustrate our theoretical model with the predicted interrelationships in Figure 1 below.

## HYPOTHESES DEVELOPMENT

### UK as the research context

The United Kingdom as a context is interesting to study due to the progressive regulations to protect the environment over the last two decades. The UK government has had a long-term commitment to protecting the environment, which is noticed through the multiple government reviews of company law. For example, the then 'Department of Trade and Industry' in late 90s embarked on long-term deliberations in order to define the purpose of corporate, among other debates. These deliberations have led to the redefinition of companies as a major contributor to the welfare of society as well as a provider of product and service (Williamson & Lynch-Wood, 2008). The government as such requires companies to report on their sustainability performance, corporate social responsibility (CSR) and environmental performance (DTI, 2004) (e.g., the Streamlined Energy and Carbon Reporting framework). A recent review of the UK Corporate Governance reveals that the most recent UK Corporate Governance Code acknowledges the grand societal and economic challenges, which is noticed, as an example, through including of GHG emissions, energy use as performance metrics by stakeholder groups (FRC, 2020).



**FIGURE 1** Theoretical model with predicted interrelationships between CEO tenure, CEO horizon and CEO seasons and environmental management.

The KPMG Survey of Sustainability Reporting has praised the UK performance over the last two decades, with the United Kingdom reported to have performed in the top 90 percentiles (KPMG, 2008, 2011, 2013, 2017, 2020). The United Kingdom is among three countries (Italy, Spain and the United Kingdom) that serve as an example for the region in sustainability reporting. In addition, large companies in the three countries lead a world class example in CSR reporting globally. The quality of CSR reporting in the UK companies reflects the maturity of reporting standards compared with global markets such as China (KPMG, 2013, 2017). The UK witnesses a slight drop in CSR reporting between 2011 and 2013 but that was reported to trail the changes in company composition following the financial crisis, and the reporting has bounced again to top the 90s percentile. Reporting on greenhouse gas (GHG) emissions has been mandatory for large and medium companies in London Stock Exchange since 2013, which explains in part the improvement in CSR reporting recently (TCFD, 2020). In KPMG's latest report, it is noticed that the UK companies increasingly recognise climate change as 'board level strategic risk' (KPMG, 2020). The UK is also committed to net zero by 2050 in recent COP26. This means that by 2050, the United Kingdom commits to bringing down the GHG emissions to net zero, which entails companies to report their contribution and progression to this strategy. This comes in line with, and following Brexit referendum in 2016, the UK government amended the Companies Act, Section 172, to integrate the European Directive of Non-Financial Reporting Directive (NFRD) (FRC, 2020). The new changes now require all quoted companies to disclose information that provides a better understanding of their activities (e.g., environmental activities) to assess the scope, alignment with policies and

outcomes of such activities (Rode et al., 2021). These reforms are aimed at improving companies' environmental performance and fulfilling stakeholders expectations against climate changes (Nuber & Velte, 2021).

In summary, all of the above combined indicate that the United Kingdom is responding to calls for improving environmental reporting and the alignment of corporate governance with the ambitious strategy of the government to reach net zero by 2050. In addition, the contrast of decreasing tenure and increasing age are interesting to investigate from the environmental management point of view (Spencer Stuart, 2018, 2021). This begs for investigating how CEO career dynamics are related to these reforms, which this paper aims to investigate.

## CEO tenure

In their foundational study on upper echelons theory, Hambrick and Mason (1984) argue that long standing CEO tenure are risk averse and therefore biased to adopt more conservative approaches due to bounded rationality, myopic perceptions of current status of the firm, and protectionist approach to their financial benefits. Hambrick and Fukutomi (1991) have suggested that newly appointed CEOs will start with little knowledge of the firm and then shortly gain more experience about the firm and the surrounding environment, yet subsequently, these CEOs will become uninterested or less enthusiastic, leading the relationship between CEO tenure and performance to be nonlinear (inverted U-shape) (Hambrick & Fukutomi, 1991). Previous studies on the relationship between CEO tenure and firm performance suggest that CEOs go through mainly two phases while in their positions. The first is the 'initial phase' where CEOs start

their learning process within the firm and the surrounding environment and such CEOs will adopt management strategies that would be in line with the firm, then the second phase takes place, where CEOs will become committed to their own paradigms, and in accordance to that, their firms will be more aligned with the CEOs attitude in such stage. Hence, the relationship is an inverted U-shape between CEO tenure and firm performance (see, e.g., Hambrick & Fukutomi, 1991; Henderson et al., 2006; Miller, 1991; Miller & Shamsie, 2001).

Firms will select CEOs who fit with firm needs, firm performance and the requirements of the job, leading newly appointed CEOs to have a paradigm that is in line with the firm needs. Such CEOs will be more influential than randomly selected executives (Finkelstein & Hambrick, 1996; Henderson et al., 2006). While the early appointed CEOs have a clear idea of the job, they will find it difficult to exercise strategic decisions based on their paradigm as they are more focused on firm's and board's needs (Henderson et al., 2006). Indeed, it will take time for CEOs to influence changes on firm performance and directions as this will depend on how long it will take them to have their own teams (who share the same mindset as the CEOs), which will eventually lead the firm to move in a direction congruent with their CEO's paradigm. This shift will depend on the timeframe of changes (for both firms and CEOs) to take place and how to adapt to these changes. Thus, leading to two phases, the first will be when CEOs attitudes are consistent with the firm and the second is when the mismatches between CEOs and firms materialise leading to the decline in firm performance.

Following on firm performance studies but in the context of CSR and environmental management, long-tenured CEO are found to strive in their environmental management by avoiding irresponsible actions to environment and tend to focus on improving firm's environmental performance (Cho et al., 2019). Accordingly, CEOs are profoundly involved in environmental management to step away from risking firm's reputation, resulting in the accumulation of an environmental record commensurate with the aspirations of the firm and society (Chen et al., 2019; Godos-Díez et al., 2020). This may also lead the CEO, in some cases, to oppose the firm's board in the event that there are decisions supported by the board and potentially may impair the firm's environmental reputation. Furthermore, the relentless pursuit of CEOs to protect the environmental record gains, that they accumulated throughout their tenure, from board's opportunistic behaviour might lead CEOs to be more conservative in their decisions. Having said that, in many cases, this positively impacts CEO's career and makes them desirable internally and to competitors, which leverages the CEO's bargaining power in any promotion negotiations or in the worst scenario, would facilitate the CEO's movement to a competitor. In the same vein, long-tenured CEO's environmental management may be

explained as a hedging behaviour to refute or alleviate flawed management decisions that might have an inverse effect on firm value (Gul et al., 2020). In this study, we argue that CEOs in their early tenure (new CEOs in the firm) are enthusiastic, with fresh minds and clear strategic ideas and thoughts towards the environment. However, these CEOs will lose such enthusiasm later in their post as their ideas, thoughts and paradigms soon will be adjusted. From the UK context, CEO observable characteristics trends (e.g., tenure and age) seem to be changing over the past 10 years (Spencer Stuart, 2018, 2021). A recent industry report shows that the average length of service (i.e., tenure) for UK CEO 4.7 years (Spencer Stuart, 2021) and that this trend has been slightly decreasing since 2017 compared with the average age of 54.3, which has slightly increased since 2017 (Spencer Stuart, 2018). In addition, a recent UK government report from the Department for Business, Energy and Industrial Strategy (BEIS) observes that for UK CEOs, firm targets (such as environmental management) are key in influencing CEO's behaviour, actions and decision making (BEIS, 2021). This leads to the importance of CEO tenure in environmental management within our context and following Henderson et al.'s (2006) view, we argue that the effectiveness of CEOs will first increase, yet shortly after that, it will decline, leading to a concave relationship between CEO tenure and environmental management. Hence, reflecting on the experience of CEO based on his/her tenure, we posit the following:

**H1.** CEO tenure has a concave (inverted U-shape) association with environmental management.

## CEO career horizons

Drawing chiefly on upper echelons theory, the conceptualisation of career horizon suggests that CEO's priorities and incentives change as CEO comes closer to retirement (Krause & Semadeni, 2014). The change is manifested in that CEOs with short career horizon (i.e., shorter time to retire) are more protective and risk averse compared with those who have longer career horizon (longer time to retire). That said, with career horizon shortening, CEOs will be less likely to develop firm strategies that may lead to uncertainties with investments (Antia et al., 2010). As CEOs with short career horizon getting closer to retirement and consequently the time to cash out, their personal motivations become more salient, and therefore, they become more likely to think of short term gains than long term gains (Yunlu & Murphy, 2012). This may necessarily mean that healthy firm performance is crucial for maximising their personal financial goals (Matta & Beamish, 2008), and therefore, they tend to act more conservatively to avoid risk (Dechow & Sloan, 1991).

Considering Matta and Beamish (2008), CEOs with short career horizon are less likely than those with long career horizon to lead on firm strategic changes. One explanation to this is that CEOs with short career horizon are largely psychologically committed to the firm to which they wish to cause the least damage when they are close to retirement (Ortiz-de-Mandojana et al., 2019) while another explanation is the current state of age and life commitments of CEO with shorter career horizon entail financial and job security are of paramount importance, which they tend to preserve by being conservative (Hambrick & Mason, 1984; Krause & Semadeni, 2014; Matta & Beamish, 2008).

CEOs with shorter career horizon are more likely to feel indebted to their current organisation coupled with a feeling of sympathy that makes their decisions very carefully crafted to avoid any consequences that may jeopardise the firm's position and the CEO's status in the firm (Liu, 2021). For example, Lee et al. (2018) argue that CEOs with shorter career horizons will be less likely to make real option investments as the returns may materialise after they might have separated from their position. Similarly, Romano et al. (2019) argued that CEOs with shorter career horizons are risk averse when it comes to initial public offering, which delays the time a firm can go public. Matta and Beamish (2008) described this as a legacy conservation, which they argue is the main driver of risk aversion with CEOs with shorter career horizons. Cast in this light, Strike et al. (2015) elucidated the risk aversion of CEO with short career horizon as due to intentions to (1) to increase retirement related compensation, (2) grow post-retirement opportunities and (3) protect achievements legacy in the firm. In addition, McClelland et al. (2012) explained this risk aversion as due to reduced career mobility in which case CEOs with short career horizon might be less likely to find new position if they are separated from their current position, which exacerbates if the separation was involuntary. They also added that CEOs often dread the idea of retirement, and therefore, they become highly attached to their 'identity' as a top position holder (McClelland et al., 2012), which will make their decision carefully calculated to cause the least damage to the firm while they are in post, and to their legacy, afterwards.

Attending to the research on environmental performance, which views investment in environmental issues as long-term investments that requires carefully crafted strategies by firm directors, we assume that the decisions related to environmental performance are strategic to the company, and as such, CEO's career horizon plays a pivotal role in making strategic environmental decision that have significant impact on environmental performance. Oh et al. (2016) argued that CSR investment are reduced with the shortening of career horizon, meaning CEOs with short career horizon are less committed to invest on environmental protection. However, in a recent study on family business, Meier and Schier (2021) found that

career horizon is positively related with CSR investment only with a family CEO, but their findings show a negative relationship between career horizon and CSR investment with a nonfamily CEO. They explained that this is due to family CEOs concerns about family interests such as the intergenerational succession within the firm. Suárez-Rico et al. (2018) studied 93 companies in the Pacific Alliance and reported that CEO Horizon is positively related with CSR disclosure via social media such as Twitter. In their findings, they argued that CEOs with shorter career horizon will be less likely to change strategies of disclosure and therefore will rely on traditional disclosure, compared with CEOs with longer career horizon who will be more likely to use Twitter for CSR disclosure in a signal to adaptation to changes that may be sought by stakeholders. As mentioned before, the UK CEO's average age seems to be changing over the past years (Spencer Stuart, 2021) to 54.3 years, which is a slight increase since 2017 (Spencer Stuart, 2018) and given the importance of CEO age in determining his/her horizon, we believe that in the United Kingdom, CEO's long career horizon and their motivation to invest in environmental initiatives will be significant. We measure career horizon as the number of years for CEOs to retire (we used around 70 years as a possible retirement age for CEOs) and posit (based on CEOs motivations) that

**H2.** CEO horizon is positively associated with environmental management.

### CEO seasons—additional view

Driving from our discussion in CEO tenure, and as a further check for CEO career, we are interested in the CEO seasons to investigate in more detail the overall view of the relationship between CEO seasons and environmental management. CEO season is a further hypothesis that this study proposes alongside the two main hypotheses related to CEO tenure and horizons.

The CEO seasons framework is based on the work of Hambrick and Fukutomi (1991) who argue that CEOs go through different seasons during their tenure period. This is due to how their experience and efficiency are shaped throughout the tenure period which can lead to different attitudes between early tenured and long tenured not just in relation to performance (e.g., Barker & Mueller, 2002; Cirillo et al., 2021; Devers et al., 2007; Henderson et al., 2006) but also in other risk-related decisions such as the environment. Thus, we argue that CEOs will progress within the CEO seasons and that will shape their reaction to environmental management.

Looking at early tenured CEOs on the other hand, they are less likely to act in a similar way to those CEOs in the position for a longer timeframe. Newly appointed CEO or short-tenured CEO tend to take more risk because they might be willing to invest in risky and

innovative ventures or technologies (Ali & Zhang, 2015; Wu et al., 2005). In what Laverly (1996) describes as 'economic short termism', early tenured CEOs may show opportunism on the short run to gain the company quick wins in the attempt to convince directors and the labour market of their suitability of the post (Ortiz-de-Mandojana et al., 2019). Attending to that behaviour, early tenured CEOs tend to act differently to environmental challenges. In one way or another, the experience deficit may play a role in that behaviour, but this could also be well explained due to asymmetry of information and over-commitment to the board. This makes early tenured CEOs more aligned with board's decisions even in the case of risk to environmental management that CEOs may be less likely be aware of (Godos-Diez et al., 2020). However, Chen et al. (2019) and Huang (2013) reported a positive relationship between environmental performance and CEO early tenure due to the growing interest in corporate social responsibility as an indicator of corporate performance.

Accordingly, CEOs in their early career (early season) tend to be in the 'response to mandate and experimentation' stage where they adopt new approaches to meet the expectations of the board. However, CEOs in their later career (advanced season) are in the 'convergence' stage where they move to a 'dysfunction' status of their career. Hence, following the argument of Chen et al. (2019) and Huang (2013), we expect that CEOs in 'response to mandate and experimentation' stage (those within 3 years in the position) will be more likely to engage with the environment while CEOs in their 'convergence' stage (those with 9 years and more in the position) (Hou et al., 2017) will be negatively associated to the environment, leading to our third hypothesis to be:

**H3.** CEOs in their 'response to mandate and experimentation' stage are positively associated to environmental management while CEOs in their 'convergence' stage are negatively associated to the environment.

## SAMPLE AND RESEARCH METHOD

### Sample and data

Our sample is composed of UK nonfinancial listed firms in FTSE 350 that provided the required financial and governance information within the investigated period of 2003 to 2016. We focused on this period of time due to the reforms of environmental performance in the UK during that time period. We started collecting data from 2003 as this is the starting point of data available in DataStream for corporate governance factors. We then had to stop collecting more data in 2016 as this marks the year of Brexit referendum, which has again motivated mobility of several CEOs back to Europe to mitigate any

uncertainties that may result from any future Brexit deal then. We obtain the CEO career dynamics data from BoardEx and the environmental data from Thomson Reuters Database (DataStream). We follow previous studies and exclude financial firms as these firms have different structures and regulations, and the financial ratios of such firms might differ than the nonfinancial firms. Finally, we allow firms to freely enter and exit the market to avoid any survivorship bias. We also control for internal corporate governance and institutional ownership and collect such data from DataStream. Table 1 shows the descriptive statistics, reporting that our sampled firms have a low average in the two environmental measures. Our environmental index measured as a ratio of eight environmental policies (related to product environmental management) has an average of 20%, while the environmental index obtained from ESG Thomson has an average of 45.6%, which is relatively low for listed companies in the United Kingdom. The average CEO tenure in our sample is 6 years with a maximum of 40 years, and the average age of the CEOs in our sample is around 53 years and the youngest CEO is in their early 30s. For the board size, it is, on average, 9 members, and about 65% of these directors are independent directors.

To check for any multicollinearity issues in our sample, we report the correlation matrix in Table 2. We find evidence that the correlations among the independent variables are low, and hence, there is no issue of multicollinearity. One noticeable exception is between the CEO career dynamics, which is expected given the nature of these variables, we also report the variance inflation factor values for all the variables and the values are all around 1, confirming no multicollinearity issue in our models.

### Research method

The study employs different regression models to empirically examine our main hypotheses. First, we conduct different empirical models to examine the impact of CEO tenure and CEO horizon on environmental management in our sample of listed UK firms for the period from 2003 to 2016. Our baseline regression model is a fixed effects panel data that include year dummies to control for any unobserved effects not captured by our variables. The main regression model is represented by two equations:

$$\begin{aligned} \text{ENV}_{i,t} = & \beta_0 + \beta_1 \text{CEO} - \text{tenure}_{i,t} + \beta_2 \text{CEO} \\ & - \text{tenure}_{i,t}^2 \beta_2 \text{CEO} - \text{horizon}_{i,t} + \beta_3 \text{CG} \\ & - \text{controls}_{i,t} + \beta_4 \text{firm} - \text{specific}_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (1)$$

where ENV has two measures, Env-mgratio is measured as an index of eight environmental policies reflecting product environmental innovation. Our second index,



**TABLE 1** Summary statistics.

Variable	Average	Standard deviation	Min	Max
Env-mgtratio	0.2159	0.24512	0	1
Env-score	45.61903	35.69899	0	97.47
CEO tenure	6.229713	5.450919	0	40.4
CEO horizon	20.40977	6.364834	0	42
'Response to mandate and experimentation' stage-CEOs	.308046	0.4618184	0	1
'Convergence' stage-CEOs	.2034483	0.4026789	0	1
Board size	9.355172	2.364986	4	20
Board independence	0.656191	0.125729	0.2778	1
Institutional ownership	0.101747	0.11457	0	0.7
Profitability	0.79766	0.1521	-0.7862	-0.995
Leverage	0.197588	0.158769	0	0.998
Firm size	14.67062	1.54054	9.94324	19.1612
Liquidity	1.603876	1.358913	0	21.612
MB	4.282569	33.08972	0	830.36

Note: Variables are defined in Table 3.

Env-score, which is commonly used in the literature (see, e.g., Shahab et al., 2020), is based on the ESG Thomson Reuters. CEO tenure is the number of years for the CEO in their position and CEO horizon is time in years for their retirement (assuming the remittance is around the age of 70). We control for CG factors including board size, board independence and institutional ownership factor. Firm-specific factors are included and controlled for, and these include firm size, leverage, liquidity and market to book ratio. The standard errors are clustered to capture the firm-specific panel effects.

Different studies have investigated the impact of corporate governance and CSR/environmental management (see, e.g., Endo, 2020; García Martín & Herrero, 2020; Jain & Jamali, 2016; Naciti, 2019; Shahab et al., 2020; Yamak et al., 2019). Accordingly, we control for board and ownership structure factors (board size and independence and institutional ownership) as these are commonly used antecedents of corporate social responsibility and environmental management (Chen et al., 2019; see, e.g., Shahab et al., 2020). We argue that good governance practices will have a direct impact on strategic decisions such as those related to corporate social responsibility and environmental management activities. In this line of inquiry, board size is a key factor in board composition, and there has been an abundance in research on efficiency (or the lack of) of board size. Research studies show contradicting results on board size; however, there has been a voluminous evidence that small boards are more efficient as a governance tool (Boone et al., 2007), given that large boards display free riding behaviour and have more agency problems (Jensen, 1993); therefore, we expect that board size will inversely affect environmental management (see, e.g., Prado-Lorenzo & Garcia-Sanchez, 2010). In addition, boards that employ

independent directors will have better human resources to make decisions as these directors will share their experiences and thus will help senior management in taking strategic decisions such as those related to environmental decisions. Finally, institutional ownership might be more oriented towards profitable projects and hence less keen to invest in nonvalue-added projects such as corporate socially responsible projects including those related to the environment.

We also estimated different models to examine the relationship between CEO horizon and environmental management and CEO different age categories and environmental management. Finally, and to check for the robustness of our models, we use different estimation methods for our ENV models by employing Tobit analysis as the indexes we adopt have positive values and/or zero. In addition, we re-estimate our models using IV regression models to control for any possible endogeneity issue in our models. The aim of these models is to make sure our results are robust after controlling for different econometric specifications and estimations. The model includes the lag of corporate governance factors as instrumental variables.<sup>1</sup>

Finally, we are interested to explore more about CEO tenure within the CEO seasons context by examining the effect of CEOs in their 'convergence' stage and those in their 'response to mandate and experimentation' stage. To do so, we include 'response to mandate and experimentation' stage as a dummy variable that reflects the first 3 years of the CEO in their role and a 'convergence' stage dummy for those with 9 years and more in their

<sup>1</sup>The Sargan test for the instruments was insignificant indicating that these instruments are valid for our models.

TABLE 2 Correlation matrix.

	CEO tenure	CEO horizon	'Response to mandate and experimentation' stage CEOs	'Convergence' stage CEOs	Board size	Board Independence	Institutional ownership	Profitability	Leverage	Firm size	Liquidity	MB
CEO tenure	1											
CEO horizon	-0.4500	1										
'Response to mandate and experimentation' stage-CEOs	-0.5500	0.2898	1									
'Convergence' stage CEOs	0.6500	-0.3362	-0.3446	1								
Board size	0.0828	-0.1428	-0.0161	0.0674	1							
Board independence	-0.093	-0.0097	-0.0205	-0.0811	0.1129	1						
Institutional ownership	-0.0367	0.0155	0.0659	-0.0221	-0.1298	-0.2115	1					
Profitability	0.0441	0.0482	-0.0428	0.0467	-0.0312	-0.0412	0.0375	1				
Leverage	-0.1457	0.0691	0.0602	-0.1205	0.0982	0.1153	-0.0246	-0.1926	1			
Firm size	-0.0637	-0.1505	0.006	-0.0697	0.5671	0.4089	-0.2747	-0.2783	0.216	1		
Liquidity	0.1	0.0849	-0.0263	0.0913	-0.2039	-0.0634	-0.0108	0.022	-0.2741	-0.1538	1	
MB	0.0263	0.0071	-0.0444	0.0315	0.0071	0	0.0136	0.6529	-0.0856	-0.1198	-0.0257	1
VIF	1.35	1.33	1.21	1.79	1.6	1.27	1.11	1.98	1.18	1.99	1.17	1.78

Abbreviation: VIF, variance inflation factor.

tenure (Hou et al., 2017) and then re-estimate Equation (1) to test our third and further hypothesis.

$$\begin{aligned} \text{ENV}_{i,t} &= \text{ENV}_{i,t} \\ &= \beta_0 + \beta_1 \text{CEO} - \text{tenure}_{i,t} + \beta_2 \text{CEO} - \text{tenure}_{i,t}^2 \\ &\quad + \beta_3 \text{CEO} - \text{horizon}_{i,t} + \beta_4 \text{CEO} - \text{early} \\ &\quad - \text{tenure}_{i,t} + \beta_5 \text{CEO} - \text{late} - \text{tenure}_{i,t} + \beta_6 \text{CG}_{i,t} \\ &\quad + \beta_7 \text{firm} - \text{specific}_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (2)$$

## Variables definitions

We have four categories of variables included in our study (i) environmental management indexes; (ii) CEO career dynamics (tenure, horizon and seasons); (iii) corporate governance including: board size; board independence, and institutional ownership; and finally, (iv) firm specific factors. Our main variable of interest in this study is environmental management. Our first index includes eight policies, namely related to product environmental management: if the firm has internal communication tools to ensure good environmental management (item number ENRRDP011); if the firm has an environmental management team (item number ENRRDP008); if the firm has an R&D investment in environmentally friendly projects with limited emissions (item number ENPIDP024); if the firm has an eco-design product (item number ENPIDP069); if the firm has demineralisation policy (item number ENPIDP0013); if the firm has an eco-design policy (item number ENPIDP0012); if the firm has a product life cycle assessment policy (ENPIDP0011); if the firm has a general fit to purpose product innovation policy (item number ENPIDP0014).

These factors are dichotomous variables that take 1 if the firm has adopted such policy in a given year or not. This index is an equally weighted index from all nine factors that will have a maximum score of 8 if a firm has all these policies in a given year and the lowest will be zero. Then a ratio of the firm score to the maximum score is obtained to proxy for our environmental product management ratio. The second and equally important environmental factor is obtained from ESG Thomson Environmental pillar (index) (item number ENVSCORE), which consists of three main categories: (1) resource use including firm's ability to minimise the use of materials and energy and being more eco-efficient firm; (2) emission reduction, which includes the firm's commitments and effectiveness to minimise emissions; and (3) environmental innovation reflecting the firm's ability to minimise environmental related costs and the ability to create new environmental technologies and practices to produce eco-efficient products. The score of

TABLE 3 Variables definition.

Variable	Definition
Env-mgratio	An equally weighted index from all eight ESG Thomson factors: ENRRDP011; ENRRDP008; ENPIDP024; ENPIDP069; ENPIDP0013; ENPIDP0012; ENPIDP0011; and ENPIDP0014. take 1 if the firm has adopted such policy in a given year or not. Then a ratio of the firm score to the maximum score is obtained.
Env-score	ESG Thomson Environmental pillar (index) (item number ENVSCORE) including resource use; emission reduction; and environmental innovation.
CEO tenure	The total number of years the CEO is in his/her position
CEO horizon	The number of years for the CEO to retire (measured as 70—CEO age).
Response to mandate and experimentation' stage CEOs	A dummy variable for the first 3 years of the CEO in power and
'Convergence' stage CEOs	A dummy variable reflects the CEO with 9 or more years in power
Board size	The number of executive and non-executive directors in the board.
Board independence	The percentage of independent directors to the total number of directors.
Institutional ownership	The total number of shares owned by institutions to the total number of outstanding shares.
Profitability	Firm size measured as, liquidity measured
Leverage	Total debt to total assets ratio
Firm size	The natural logarithm of total assets
Liquidity	Current assets to current liability ratio
MB	is the market to book ratio

this index is between 0 and 100, with a higher score showing a better environmental practice.

As regards CEO career dynamics, we measure CEO tenure as the total number of years the CEO is in his/her position and CEO horizon as the number of years for the CEO to retire (measured as 70—CEO age). CEO seasons include the 'response to mandate and experimentation' stage as a dummy variable that reflects the first 3 years of the CEO in their role and a 'convergence' stage dummy for those with 9 years and more in their tenure (Hou et al., 2017). Board size is the number of directors in the board and board independence is the percentage of independent directors to the total number of directors. Institutional ownership is the total number of shares owned by institutions to the total number of outstanding shares.

TABLE 4 The relationship between tenure and ENV.

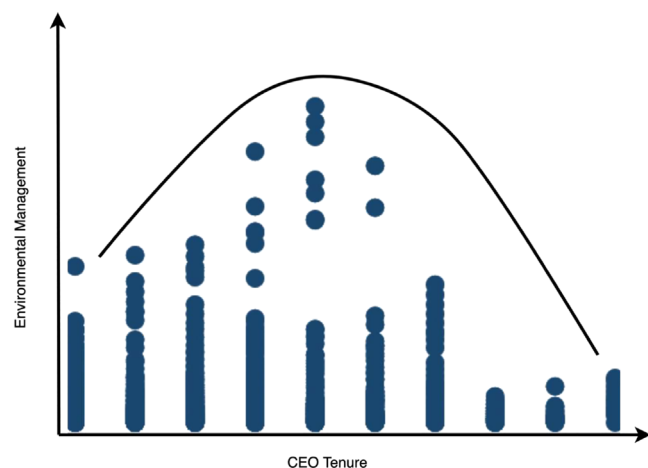
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CEO tenure	M1 0.00951*** (0.00101)	M2 0.0181*** (0.00199)	M3 0.0209*** (0.00228)	M4 0.0152*** (0.00250)	M5 0.0115*** (0.00135)	M6 0.0222*** (0.00267)	M7 0.0253*** (0.00307)	M8 0.0175*** (0.00334)
CEO tenure <sup>2</sup>		-0.000463*** (9.28e-05)	-0.000547*** (9.88e-05)	-0.000455*** (0.000102)		-0.000577*** (0.000125)	-0.000642*** (0.000133)	-0.000419*** (0.000137)
CEO horizon			0.00188* (0.00109)	0.00185 (0.00124)			0.00268* (0.00147)	0.00270 (0.00165)
Board size				-0.00966*** (0.00285)				-0.0119*** (0.00381)
Board independence				0.169*** (0.0484)				0.170*** (0.0647)
Institutional ownership				-0.186*** (0.0355)				-0.284*** (0.0478)
Profitability				0.000636 (0.000402)				0.00117** (0.000535)
Leverage				-0.138*** (0.0432)				-0.157*** (0.0579)
Firm size				0.0969*** (0.00968)				0.0863*** (0.0129)
Liquidity				-0.00657 (0.00485)				-0.00226 (0.00648)
MB				-3.88e-06 (0.000143)				-0.000179 (0.000191)
Constant	0.146*** (0.00718)	0.125*** (0.00832)	0.0742** (0.0295)	-1.275*** (0.143)	0.381*** (0.00966)	0.354*** (0.0112)	0.285*** (0.0396)	-0.889*** (0.191)
Observations	2098	2098	2084	1740	2092	2092	2078	1733
R <sup>2</sup>	0.044	0.056	0.059	0.204	0.036	0.047	0.048	0.150
Number of id	164	164	164	157	164	164	164	156

Note: Variables are defined in Table 3.

\*\*\*Significant at 1%.

\*\*Significant at 5%.

\*Significant at 10%.



**FIGURE 2** Curvilinear relationship between CEO tenure and environmental management.

As regards firm-specific factors, we include in our models: firm leverage measured as total debt to total assets ratio, firm size measured as the natural logarithm of total assets, liquidity measured as current assets to current liability ratio and MB measured as the market to book ratio. We summarise the definitions in Table 3.

## RESULTS

In this section our regression results are provided. We run different models, and we start with panel data models. Table 4 shows six models, the first three are for the product environmental management ratio (from the eight policies) and the second three models are for the environmental index (from Thomson Reuters). Models 3 and 6 include all variables, whereas other models exclude the squared value of CEO tenure and/or firm-specific factors. All the models reported in this section are supported by the Hausman test of the panel models.

Regarding the CEO tenure, we report that there is a positive association between CEO tenure and environmental management indexes. This shows that if environmental activities are considered to be strategic decisions adopted by management, then the more the experienced CEOs in their positions the more they engage in environmental activities and environmental management. This positive association is theoretically consistent with our expectations and the upper echelons theory (Hambrick, 2007) that CEO's observable characteristics such as tenure are crucial in explaining to what extent the CEO's vision is strategic when it comes to environmental management of the firm. The positive sign is also in support of the findings of Chiu and Sharfman (2018) as they reported that CEOs are highly likely to lose their jobs based on their CSR weak performance and therefore CEOs will use their experience to invest in environmental

projects to improve the financial performance of the firm. Similarly, our results are in line with Hubbard et al. (2017) who report that the board considers CSR activities as a key driver for CEO's performance. We are interested to examine if this relationship is nonlinear and hence, we included the squared value of the CEO tenure, Models 2, 3, 4, 6, 7, and 8 show that the relationship between CEO tenure is positive while the squared values of CEO tenure is negative. Hence, we provide strong evidence that this relationship is nonlinear with an inverted U-shaped relation. This result is in line with our main hypothesis and shows that CEOs' attitude towards environmental management changes by time, they start with being enthusiastic to the environment but shortly after that they lose such interest leading the relationship to be negative with environmental management. Our results are consistent with previous performance studies inspired by upper echelons theory such as Hambrick and Fukutomi (1991); Miller (1991); Miller & Shamsie (2001); Henderson et al. (2006). We represent this relationship in Figure 2. Our results also respond to the calls of (Bromiley & Rau, 2016) for more research on upper echelons theory from aspects different to pure financial performance.

CEO horizon is reported to be positive and significant, in Models 3 and 7, and hence, we provide evidence that CEO horizon has positive and direct influence on environmental management. This result indicates that the CEOs with more time to retirement are more engaged in environmental activities. Our finding is in line with previous studies related to CSR such as Meier and Schier (2021) and Suárez-Rico et al. (2018). Theoretically, our results are in congruence with the upper echelons theory's premise that CEO's idiosyncrasy and observable characteristics significantly impact the way firms respond to environmental issues (Elmagrhi et al., 2019; Godos-Díez et al., 2020; McClelland et al., 2012; Nguyen et al., 2021; Oh et al., 2016; Shahab et al., 2020). In addition, our results report a negative effect of board size on environmental management while independent directors are positively related to environmental management. Hence, our results show that smaller boards that appoint independent directors are more aware of environmental activities and their importance on firm performance (see, e.g., Oh et al., 2016, in US context). In addition, institutional ownership is found to be negatively associated to environmental management, indicating that investors are more focused to value-added projects and that they consider environmental activities as less attractive projects to be translated to positive influence on firm performance. This result is consistent with the CSR literature such as of Chen et al. (2019). Finally, the results reported in Table 4 show that large firms with lower leverage do engage with environmental activities.

We also introduced a new regression model to examine the impact of CEO tenure and different categories of CEO horizon and reported these results in Table 5. We

**TABLE 5** Further investigation on CEO horizons.

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	M1	M2	M3	M4	M5	M6
CEO horizon-2	-0.141*** (0.0457)	-0.0686 (0.0457)	-0.142*** (0.0468)	-0.123** (0.0613)	-0.123** (0.0613)	-0.121** (0.0604)
CEO horizon-3	-0.163*** (0.0465)	-0.0511 (0.0474)	-0.125** (0.0485)	-0.148** (0.0622)	-0.148** (0.0622)	-0.0994 (0.0624)
CEO horizon-4	-0.194*** (0.0518)	-0.0490 (0.0535)	-0.104* (0.0538)	-0.143** (0.0695)	-0.143** (0.0695)	-0.0313 (0.0694)
CEO tenure		0.0100*** (0.00116)	0.0214*** (0.00218)			0.0251*** (0.00289)
CEO tenure <sup>2</sup>			-0.000629*** (0.000103)			-0.000676*** (0.000133)
Constant	0.359*** (0.0455)	0.202*** (0.0483)	0.246*** (0.0483)	0.589*** (0.0610)	0.589*** (0.0610)	0.461*** (0.0656)
Observations	2084	2084	2084	2078	2078	2078
R <sup>2</sup>	0.009	0.046	0.064	0.004	0.004	
Number of id	164	164	164	164	164	164

Note: Variables are defined in Table 3.

\*\*\*Significant at 1%.

\*\*Significant at 5%.

\*Significant at 10%.

categorised CEO horizon to four categories, Category 1 shorter or equal to the 25 percentile to reflect early horizon; Category 2 between 25 percentile and less than the 50 percentile that could reflect the short to medium horizon; Category 3 is equal to the 50 percentile which can cover the medium horizon; and finally Category 4 reflects those equal or higher than the 75 percentile (high tenure). The regression models include two to four categories and the constant will serve as the short horizon category. Our results show that CEO tenure has a non-linear relationship with environmental management, which provides additional support to our main arguments in this work related to H1. As regards to CEO horizon categories, we notice that the constant (serving short-term horizon) is positive and Categories 2–4 (reflecting long-term horizons over time) are negative. This result might support that CEO horizon has a positive effect on the first phase and then moving with time CEO horizon will have a negative effect on environmental management, and hence, one can argue that this is a similar pattern as in our reported results for CEO tenure. Thus, we argue that CEO horizon is one of the important antecedents of environmental management and thus supporting our argument of H2.

For further robustness checks for our results related to CEO tenure and CEO career horizon, we run the Tobit model and report it in Table 6. The reason behind using the Tobit regression is that the values of the environmental management factors are positive or zero, and hence, such model will be suitable, and the results might provide additional support to our findings.

Similar to our previous findings, the results show that there is a concave relationship between CEO tenure and environmental management confirming that CEOs start with being interested in environmental activities then they lose interest over their tenured time. Hence, confirming our main hypothesis (H1). It is also reported that CEO career horizon is positively associated with environmental management, confirming our previous findings in Table 4 and in line with our second hypothesis (H2). Theoretically, our results are in line with the upper echelons theory's premise that CEO's observable characteristics significantly impact the way firms respond to strategic issues (Bromiley & Rau, 2016) such as environmental issues. In addition, we report that board size and institutional ownership are negatively related to environmental management while board independence is positively related to environmental management, which is in line with our expectations and previous findings. Finally, large and higher profitable firms that have low leverage in their capital structure are more engaged in environmental activities.

As a final robustness check we employ IV two stages regression analysis and report the results in Table 7. Our results related to CEO career dynamics are similar to those reported in our previous findings, supporting our arguments related to CEO tenure and CEO horizon. Therefore, our results are consistent after controlling for any possible endogeneity issues.

We also run different models using lagged independent variable but for parsimony we have not reported these models in our paper. The findings for lagged

TABLE 6 Tobit checks.

Variables	M1	M2	M3	M4
CEO tenure	0.0306*** (0.00359)	0.0246*** (0.00378)	0.0323*** (0.00401)	0.0261*** (0.00429)
CEO tenure <sup>2</sup>	-0.000775*** (0.000147)	-0.000598*** (0.000146)	-0.000817*** (0.000168)	-0.000569*** (0.000170)
CEO horizon	0.00117 (0.00169)	0.00323* (0.00196)	0.00166 (0.00187)	0.00367* (0.00216)
Board size		-0.0123*** (0.00423)		-0.0132*** (0.00485)
Board independence		0.353*** (0.0744)		0.267*** (0.0843)
Institutional ownership		-0.405*** (0.0602)		-0.434*** (0.0662)
Profitability		0.00133** (0.000616)		0.00156** (0.000704)
Leverage		-0.170*** (0.0637)		-0.155** (0.0728)
Firm Size		0.105*** (0.0131)		0.0789*** (0.0143)
Liquidity		-0.0133 (0.00860)		-0.00497 (0.00951)
MB		-0.000124 (0.000218)		-0.000278 (0.000249)
Constant	-0.0563 (0.0519)	-1.627*** (0.200)	0.222*** (0.0581)	-0.923*** (0.216)
Observations	2,084	1,740	2,078	1,733
Number of id	164	157	164	156

Note: Variables are defined in Table 3.

\*\*\*Significant at 1%.

\*\*Significant at 5%.

\*Significant at 10%.

independent variables show similar results and confirm the positive nonlinear effect of CEO tenure on environmental management and there is a positive association between CEO horizon and environmental management. Hence, our results are robust using different econometric specifications.

Our robust empirical results strengthens the theoretically underpinning arguments of the upper echelons theory (Hambrick, 2007) in which we provide support that CEO's observable characteristics such as tenure and career horizons are crucial in explaining to what extent the CEO's vision is strategic when it comes to environmental management of the firm.

It is worth noting that our results are generalizable as our sample contains the largest nonfinancial publicly listed firms listed in FTSE 350 that provided the required information related to environmental management and given the robust checks, we are confident that these results can be generalised and examined in different similar contexts.

Finally, we empirically examine the impact of CEO seasons to test for our third hypothesis (H3). Table 8 includes the CEO seasons factors reflecting the two stages (seasons) of their career. CEOs in their 'convergence' stage are found to be positively related to environmental management only in Models 6 and 7. In addition, there is limited evidence that CEOs in response to mandate and experimentation stage are negative and significant, which contradicts our expectations in H3. Hence, this might show a weak support of the CEO seasons in our sample and limited support for H3. For further robustness checks, we employed Tobit and IV analyses and report the models in Table 9. There is no evidence of CEO seasons in these models, confirming the limited support we have for CEO seasons in this study.

### Further analysis

There has been a long-standing issue in the age-based segmentation of workforce due to the possibility of

TABLE 7 IV regression models.

Variables	M1	M2	M3	M4
CEO tenure	0.0186*** (0.00418)	0.0186*** (0.00418)	0.0243*** (0.00542)	0.0243*** (0.00542)
CEO tenure <sup>2</sup>	-0.000435*** (0.000135)	-0.000435*** (0.000135)	-0.000465*** (0.000175)	-0.000465*** (0.000175)
CEO horizon	0.00364** (0.00156)	0.00364** (0.00156)	0.00641*** (0.00206)	0.00641*** (0.00206)
Board size	-0.0213** (0.0101)	-0.0213** (0.0101)	-0.0208 (0.0132)	-0.0208 (0.0132)
Board independence	-0.184 (0.471)	-0.184 (0.471)	-0.599 (0.616)	-0.599 (0.616)
Institutional ownership	-0.981*** (0.175)	-0.981*** (0.175)	-1.187*** (0.234)	-1.187*** (0.234)
Profitability	0.000543 (0.000462)	0.000543 (0.000462)	0.000708 (0.000603)	0.000708 (0.000603)
Leverage	-0.107** (0.0484)	-0.107** (0.0484)	-0.117* (0.0646)	-0.117* (0.0646)
Firm size	0.0930*** (0.0201)	0.0930*** (0.0201)	0.0905*** (0.0261)	0.0905*** (0.0261)
Liquidity	-0.00679 (0.00554)	-0.00679 (0.00554)	-0.00200 (0.00734)	-0.00200 (0.00734)
MB	-7.41e-05 (0.000149)	-7.41e-05 (0.000149)	-0.000214 (0.000197)	-0.000214 (0.000197)
Constant	-0.872*** (0.232)	-0.872*** (0.232)	-0.403 (0.310)	-0.403 (0.310)
Observations	1,589	1,589	1,583	1,583
Number of id	154	154	153	153

Note: Variables are defined in Table 3.

\*\*\*Significant at 1%.

\*\*Significant at 5%.

\*Significant at 10%.

differentiating distinct population groups stereotyped by date of birth (Fineman, 2014; Thomas et al., 2014). Once this age segmentation becomes enacted, it becomes difficult to get rid of (Thomas et al., 2014). It seems that despite the theoretical foundations of the relationship between CEO age and environmental performance (e.g., McClelland & O'Brien, 2011; Tran & Pham, 2020), empirical research is inconclusive with regard to that relationship exemplified by contradicting results. We mainly attribute this to contextual, geographical and theoretical differentiations. To resolve the inconclusiveness of research findings, we use the upper echelons theory as theoretical lens (Hambrick & Mason, 1984), through which we derive that the CEO age is important in influencing the decisions made to improve environmental performance and social corporate responsibility. Upper echelons theory allows to view the relationship between CEO age and environmental performance from a strategic performance perspective where we can observe decisions and their impact on performance. In doing so, we

depart away from the complicated terrains of principal-agent and stakeholder complexities.

Borrowing from Hambrick and Mason (1984) to explain the variations in findings on CEO age, the early foundations of studies on CEO age have indicated to a positive association between CEO age and the propensity to seek and acquire information to make informed decisions (Taylor, 1975). As such, older CEOs are able to integrate their knowledge, expertise and cognitive apparatus to make socially responsible environmental decisions. Grounded in the same line of inquiry, those early studies report a negative relationship between younger CEOs and the ability and confidence to integrate and make sense of information to make decision (Ortiz-de-Mandojana et al., 2019; Taylor, 1975), which explains why younger CEO may tackle environmental challenges within information asymmetry, limited access to market experience and limited experience within the firm than their older counterparts (Ortiz-de-Mandojana et al., 2019). Another explanation is offered by



TABLE 8 CEO seasons.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CEO tenure	M1 0.00544*** (0.00176)	M2 0.0166*** (0.00368)	M3 0.0204*** (0.00396)	M4 0.0138*** (0.00398)	M5 0.0100*** (0.00236)	M6 0.0284*** (0.00495)	M 0.0326*** (0.00532)	M8 0.0208*** (0.00533)
CEO tenure <sup>2</sup>		-0.000418*** (0.000122)	-0.000530*** (0.000131)	-0.000423*** (0.000131)		-0.000690*** (0.000163)	-0.000789*** (0.000176)	-0.000468*** (0.000176)
CEO horizon			0.00188* (0.00109)	0.00185 (0.00124)			0.00267* (0.00147)	0.00264 (0.00165)
'Response to mandate and experimentation' stage CEOs		-0.00831 (0.0108)	-0.00290 (0.0144)	-0.00541 (0.0138)	-0.0327** (0.0146)	0.0190 (0.0190)	0.0241 (0.0194)	0.00915 (0.0185)
'Convergence' stage CEOs		0.0182 (0.0161)	-0.000455 (0.0169)	0.00652 (0.0163)	-0.0173 (0.0217)	-0.0464** (0.0227)	-0.0470** (0.0228)	-0.0288 (0.0218)
Board size				-0.00972***				-0.0114***
Board independence				0.00287				0.00383
Institutional ownership				0.169***				0.168***
Profitability				(0.0484)				(0.0648)
Leverage				-0.186***				-0.287***
Firm size				(0.0356)				(0.0478)
Liquidity				0.000638				0.00117**
MB				(0.000402)				(0.000535)
Constant		0.180*** (0.0121)	0.0771** (0.0337)	-0.139*** (0.0432)	0.404*** (0.0162)	0.327*** (0.0244)	0.252*** (0.0453)	-0.154*** (0.0580)
Observations	2098	2098	2084	1740	2092	2092	2078	1733
R <sup>2</sup>	0.051	0.057	0.059	0.204	0.040	0.049	0.050	0.151
Number of id	164	164	164	157	164	164	164	156

\*\*\*Significant at 1%.

\*\*Significant at 5%.

\*Significant at 10%.

TABLE 9 Further analyses CEO seasons.

Variables	Tobit		IV	
	M1	M2	M3	M4
CEO tenure	0.0211*** (0.00606)	0.0295*** (0.00692)	0.0161*** (0.00436)	0.0236*** (0.00554)
CEO tenure <sup>2</sup>	-0.0005*** (0.000190)	-0.0006*** (0.000220)	-0.000389*** (0.000144)	-0.000475*** (0.000182)
CEO horizon	0.00324* (0.00196)	0.00358* (0.00216)	0.00338** (0.00140)	0.00515*** (0.00177)
'Response to mandate and experimentation' stage CEOs	-0.0164 (0.0218)	0.00491 (0.0248)	0.00369 (0.0142)	0.0228 (0.0180)
'Convergence' stage CEOs	0.00951 (0.0249)	-0.0422 (0.0286)	0.00432 (0.0168)	-0.0239 (0.0215)
Board size	-0.012*** (0.00425)	-0.0124** (0.00487)	-0.0126* (0.00745)	-0.00218 (0.00941)
Board independence	0.353*** (0.0744)	0.263*** (0.0843)	0.291* (0.164)	0.555*** (0.208)
Institutional ownership	-0.404*** (0.0602)	-0.438*** (0.0662)	-0.880*** (0.135)	-0.890*** (0.171)
Profitability	0.00134** (0.000616)	0.00156** (0.000704)	0.000774* (0.000423)	0.00101* (0.000534)
Leverage	-0.170*** (0.0637)	-0.152** (0.0728)	-0.110** (0.0467)	-0.102* (0.0595)
Firm size	0.104*** (0.0131)	0.0783*** (0.0143)	0.0765*** (0.0129)	0.0555*** (0.0164)
Liquidity	-0.0134 (0.00860)	-0.00476 (0.00952)	-0.00602 (0.00525)	0.00179 (0.00666)
MB	-0.000128 (0.000218)	-0.000274 (0.000250)	-8.99e-05 (0.000144)	-0.000206 (0.000182)
Constant	-1.608*** (0.202)	-0.929*** (0.218)	-1.018*** (0.194)	-0.834*** (0.247)
Observations	1740	1733	1576	1570
Number of id	157	156	154	153

Note: Variables are defined in Table 3.

\*\*\*Significant at 1%.

\*\*Significant at 5%.

\*Significant at 10%.

Ortiz-de-Mandojana et al. (2019) who suggested that older CEOs, contrary to younger CEOs, tend to adopt more environmentally responsible decisions, even when they are adversarial to board member's interests, as they are able to acknowledge a wider spectrum of threats and opportunities in environmental management. In two separate studies on CEO age and the extent of the effect of age on environmental performance, Huang (2013) finds that age did not have a significant impact on environmental management. This means that in their studies older and younger CEOs are indifferent to their engagement with CSR activities in the firm. Serfling (2014) explains variations, or insignificance in empirical results such as the cases in Huang (2013) is due to firm level activity

where low risk firms tend to employ older CEOs while high-risk firms tend to employ younger CEOs.

We find that past and extant literature seems to have been divided into two pathways: The first pathway indicates that young CEOs are more likely to make bold, pivotal and perhaps more aggressive decisions given the high degree of risk involved in those decisions. Prendergast and Stole (1996) argue that younger CEOs feel that they are under imminent pressures as a result of comparing their performance with old CEOs, which makes them more aggressive in their investment preferences. This may lead to socially irresponsible environmental behaviour (Belzon et al., 2019; García Martín & Herrero, 2020; Godos-Diez et al., 2020; Serfling, 2014).

**TABLE 10** Generation effect CEO age.

Variables	M1	M2	M3	M4	M5	M6
CEO tenure	0.0154*** (0.00252)	0.0151*** (0.00251)	0.0155*** (0.00251)	0.0174*** (0.00337)	0.0174*** (0.00335)	0.0175*** (0.00336)
CEO tenure <sup>2</sup>	-0.0004*** (0.0001)	-0.0004*** (0.000103)	-0.0004*** (0.000102)	-0.0004*** (0.00014)	-0.00041*** (0.00013)	-0.00043*** (0.000138)
CEO horizon	0.00191 (0.00124)	0.00193 (0.00128)	0.00229* (0.00130)	0.00268* (0.00166)	0.00285* (0.00171)	0.00272 (0.00174)
X-dummy	-0.00876 (0.0137)			0.00317 (0.0185)		
Y-dummy		-0.00620 (0.0230)			-0.0106 (0.0313)	
Baby Boomers-dummy			0.0206 (0.0188)			0.000980 (0.0252)
Board size	-0.00970*** (0.00285)	-0.00966*** (0.00285)	-0.00975*** (0.00285)	-0.0119*** (0.00381)	-0.0119*** (0.00381)	-0.0119*** (0.00381)
Board independence	0.168*** (0.0484)	0.169*** (0.0484)	0.167*** (0.0484)	0.171*** (0.0648)	0.171*** (0.0648)	0.170*** (0.0648)
Institutional ownership	-0.187*** (0.0356)	-0.186*** (0.0356)	-0.186*** (0.0355)	-0.284*** (0.0478)	-0.284*** (0.0478)	-0.284*** (0.0478)
Profitability	0.000644 (0.000402)	0.000635 (0.000402)	0.000653 (0.000402)	0.00116** (0.000535)	0.00117** (0.000535)	0.00117** (0.000535)
Leverage	-0.136*** (0.0434)	-0.139*** (0.0434)	-0.136*** (0.0432)	-0.158*** (0.0582)	-0.159*** (0.0582)	-0.157*** (0.0580)
Firm size	0.0968*** (0.00968)	0.0970*** (0.00968)	0.0967*** (0.00968)	0.0863*** (0.0130)	0.0863*** (0.0130)	0.0863*** (0.0130)
Liquidity	-0.00665 (0.00485)	-0.00654 (0.00485)	-0.00668 (0.00485)	-0.00223 (0.00648)	-0.00222 (0.00648)	-0.00227 (0.00648)
MB	-5.02e-06 (0.000143)	-3.64e-06 (0.000143)	-5.78e-06 (0.000143)	-0.000179 (0.000191)	-0.000179 (0.000191)	-0.000179 (0.000191)
Constant	-1.267*** (0.143)	-1.277*** (0.143)	-1.282*** (0.143)	-0.892*** (0.192)	-0.892*** (0.191)	-0.889*** (0.191)
Observations	1740	1740	1740	1733	1733	1733
R <sup>2</sup>	0.204	0.204	0.205	0.150	0.150	0.150
Number of id	157	157	157	156	156	156

Note: Variables are defined in Table 3.

\*\*\*Significant at 1%.

\*\*Significant at 5%.

\*Significant at 10%.

In one way or another, the lack of experience, overconfidence, hubris, leverage preferences and many other attributes of younger CEOs may play a role in that socially irresponsible behaviour, but this can also be explained well due to information asymmetry and excessive commitment to board in order to demonstrate their merits, robustness and talent. That said, some of these attributes may align younger CEOs with board decisions even in the event of risks to environmental management that the CEO who at an early career stage may have been less aware of (Godos-Díez et al., 2020). As for the second pathway, some research studies argued that the younger

the CEOs, the more they are reluctant about ventures and bold decisions because of shaky confidence in their professional future in that early stage of their career (Belenzon et al., 2019; Godos-Díez et al., 2020). Young CEOs may be tempted to avoid risk due to preconceptions of their recklessness or due to being subjected to careful scrutiny of their performance by the board which may make them inclined to adopt less risky decisions (Ortiz-de-Mandojana et al., 2019).

To address the importance of CEO age we added to our main model in Equation (1), three main generations of CEOs, Generation X; Generation Y; and baby

boomers. These are dummy variables to reflect the age category of the CEOs in our sample. We report the results in Table 10 and our results did not support that there is any effect for the CEO generations in our models, which is in line with previous literature such as Huang (2013). Yet the results confirm the nonlinear relationship between CEO tenure and environmental management and the positive association between CEO horizon and environmental activities. Therefore, this is a further support to H1 and H2.

## CONCLUSIONS

Our study provides an incremental contribution that is based on confusion spotting and neglect spotting (Nicholson et al., 2018). We spot contradicting results in previous research on the relationship between CEO career dynamics and environmental management and at the same time, particularly, we spot a neglect in the areas of CEO tenure and CEO horizons. Therefore, this paper provides new evidence in the relationship between CEO career dynamics and environmental management. Unlike other studies investigating the relationship between CEO characteristics and corporate social performance, our focus in this paper examines the environmental aspect of firms being corporate socially responsible. Using a sample of listed firms in the United Kingdom for the period from 2003 to 2016, we empirically examine the effect of CEO career dynamics on environmental management. We also examine the effect of CEO generations on environmental management as a further analysis provided in this study.

Our results show that CEO tenure has a nonlinear (inverted U-shape) relationship with environmental management, showing that CEOs start their career engaging with environmental activities, but then they start to be less efficient with regard to environmental management. In addition, we support that there is a positive association between CEO horizon and environmental management, indicating that CEO with more time to their retirement are more engaged in environmental management. We investigated the nonlinearity of CEO horizon and found the results were insignificant. However, when we employed a categorical nature of CEO horizon, the results show that early horizon has a positive impact on environmental management, yet this effect turns to be negative when CEOs move to later categories. Moreover, we provide a limited supporting evidence of CEO seasons. In our further analysis, we find no evidence of CEO generations on environmental management. The results of CEO tenure and horizon support the upper echelons theory within the UK context. As regards corporate governance factors, we detect that small boards that appoint independent directors are more engaged in environmental activities. Finally, institutional investors consider environmental practices as nonvalue

added, and therefore, they are less attracted to environmental activities.

These findings have different contributions; first for academics, it is important when investigating CEO tenure to consider the nonlinear nature of CEO tenure and to examine in more details other aspects related to CEO horizons. Second, for practitioners, it is important to consider environmental activities and more generally CSR activities as important investments that could have a positive effect on firm performance and value, as our results suggest that there is a positive effect of environmental management and firm performance. Third, policymakers should provide proper incentives for firms to engage in environmental activities as management might use such investments to minimise agency conflicts with principals. Finally, we encourage other studies to investigate the relationship between different CEO dynamics and environmental policies using cross-country analysis and to have different dimensions of CEO dynamics and examine their effect on sustainable environmental performance. Our paper has also implications for policymakers. The paper demonstrates the importance of CEO tenure and CEO horizons in environmental management, which entails first that corporate governance should be more inclusive of promotional activities to a wide spectrum of CEO experiences and motivations in light of CEO horizons. Second, companies and government should implement more inclusive policies that support the participation of those CEOs, whose interest started to fall behind environmental performance, in environmental management. This would mitigate the risk of tenure-based decisions in environmental management and encourage balanced approach to it.

Similar to other related studies, this study has few limitations. First, we investigated CEO career dynamics related only to CEO tenure, CEO seasons and CEO horizon to cover the CEO experience and motivation. Other studies are invited to focus on other aspects CEO gender, education background and compensation. Second, we use the UK context in this study and other papers investigating a cross-country analysis are highly welcomed. Third, we controlled for some governance factors and other studies might be interested to examine other factors or even the interaction effects they have on environmental management. Moreover, more studies employing cross-countries analysis are encouraged to generalise the results beyond one country. Finally, the study employs only two environmental indexes based on Thomson Reuters DataStream and other indexes might enhance the knowledge in environmental management.

## AUTHOR CONTRIBUTIONS

The project was conceived and designed by Basil Al-Najjar and Moheeb Abualqumboz. Basil was responsible for acquiring the data and conducting the analysis and interpretation. The paper was jointly written by Basil and Moheeb.

## CONFLICT OF INTEREST STATEMENT

The authors have no actual or potential conflict of interest that could inappropriately influence, or be perceived to influence, our work.

## DATA AVAILABILITY STATEMENT

Data is available upon request. Access to Eikon database (Datastream) is based on the licence obtained by Manchester Metropolitan University.

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