BJM BRITISH JOURNAL of MANAGEMENT BAM British Academy of Management

British Journal of Management, Vol. 30, 134–150 (2019)
DOI: 10.1111/1467-8551.12287

Older and Wiser: How CEOs' Time Perspective Influences Long-Term Investments in Environmentally Responsible Technologies

Natalia Ortiz-de-Mandojana, Pratima Bansal[1] and J. Alberto Aragón-Correa

University of Granada, Department of Business, Campus de la Cartuja, s/n. Granada, Spain and [1]Ivey Business School, Western University, London, ON, N6A 3K7, Canada
Corresponding author email: nortiz@ugr.es

Most theories of corporate governance argue that chief executive officers (CEOs) take less risk as they near the end of their career, and therefore are less likely to make major investments. This prediction is based on decisions related to firm-specific benefits; however, it may not be generalizable to decisions that involve broad societal goals. In terms of societal investments, CEOs with a longer time perspective may be more likely, rather than less likely, to invest. In this paper, we argue that a CEO's future time perspective is fostered by shorter career horizons, longer tenures, higher organizational ownership and less short-term compensation. We test these hypotheses on 150 observations from the US investor-owned electric power generation sector over a three-year unbalanced sample (64.3% of the population). We applied random-effects generalized least squares (GLS) estimations to test our hypotheses, and found support for three out of four hypothesized relationships.

Introduction

Managers face more pressure than ever before to demonstrate short-term returns. Stocks that were once held for seven years on average in 1960 were held for a mere eight months on average in 2016 (Roberge *et al.*, 2017). Many managers follow stock prices daily because their bonuses, promotions and professional recognition are often pegged to stock market reactions to their decisions. As a result, many managers have difficulty investing in projects that accrue benefits in the long term, especially when those benefits do not accrue to the firm directly and are seen as being more targeted to society.

Yet, some managers do invest in long-term activities that benefit society and the natural environment. For example, power plants have increasingly generated more electricity from renewable energy, even though there have been few financial incentives or regulatory requirements to do so (Delmas, Russo and Montes-Sancho, 2007; Ortiz-de-Mandojana and Aragón-Correa, 2015). Such a high commitment to renewable energy generation was risky for power plants, given market, political and policy uncertainties (Finon, 2013; Nogee *et al.*, 1999; Tietjen, Pahle and Fussb, 2016).

Previous management literature has highlighted that the perspective of time taken by management is relevant to managerial decision-making

This research was partially supported by grants from the Spanish Ministry of Science and Innovation (ECO2013-47009-P) and the Social Sciences and Humanities Research Council of Canada.
Acknowledgements: Natalie Slawinski, ISDE Research Group, Ivey's Centre for Building Sustainable Value.

(e.g. Bansal and DesJardine, 2014). Hambrick and Mason (1984) pioneered a cognitive approach to upper echelons' shaping of a firm's general decisions, and such insights have been extended to time perspectives in investment decisions (e.g. Hoskisson *et al.*, 2002). This prior research suggests that a focus on a more distant future during planning and when making strategic decision leads to positive firm-level outcomes, including greater innovation and firm performance (Das, 2006; Flammer and Bansal, 2017). In the environmental arena, the organization's time perspective has been argued to be relevant in making environmental decisions (Slawinski and Bansal, 2015; Wang and Bansal, 2012).

In spite of the clear benefits that accrue to the firm and society from investing in the long term, the corporate governance literature cannot explain why such investments would be made, given the very real short-term pressures that managers confront on a day-to-day basis. Our study aims to address this omission by introducing temporality more directly into the corporate governance literature. In this paper, we surface the temporal assumptions in the corporate governance literature, which allows us to introduce a time perspective to corporate governance. We ask: why do senior executives sometimes make long-term investments in the face of short-term pressures?

We situate our empirical enquiry in the electricity-generating industry, which is at the front line of environmental issues. In the late 1990s, a host of new environmental regulations were pending in this industry. Although aggressive energy efficiency and fuel switching were expected to reduce domestic carbon emissions to 1990 levels by 2010, reducing carbon emissions beyond that amount would require switching to low-carbon technologies, such as renewable energy generation (Nogee *et al.*, 1999). However, compared with other pollution control methods, replacing fossil fuel generators with renewable energy technologies was relatively expensive and risky in the short term. Only with a long-term view could investments in renewable technologies be seen as a viable option (Nogee *et al.*, 1999).

We extend the previous literature by identifying the time-related governance factors that may influence power plants' long-term investments in renewable energy generation. Specifically, we propose that the chief executive officer's (CEO's) career horizon, tenure, organizational ownership and compensation shift the CEO's temporal perspective, thereby influencing a firm's investments in renewable energy generation.

We collected three years of panel data from the US electric power generation industry, and applied random-effects generalized least squares (GLS) estimations to test our hypotheses. Our results supported our hypotheses regarding the effects of career horizon, organizational ownership and short-term compensation pressures.

This paper makes two relevant contributions to the previous literature. First, we apply temporally based theoretical arguments to corporate governance, recognizing that a time perspective is embedded within commonly discussed corporate governance variables, such as tenure, ownership and compensation. Prior research has recognized that some of these variables may influence the time perspective of the upper echelons, but they have not developed a temporally based corporate governance model. For example, Larcker (1983) argued that long-term CEO compensation schemes help to encourage longer-term decision-making horizons by generating some coincident approaches of agents and principals, and found that the market responded favourably to firms that announced the adoption of long-term CEO incentive plans. Additionally, Hoskisson *et al.* (2002) found that managers were more likely to invest in research and development when the firm was owned by institutional investors who had a long-term orientation. Most studies focus on a single variable, rather than recognizing that a CEO's time perspective is shaped by a confluence of factors, such as the CEO's career horizon, tenure, ownership and compensation.

Second, our study surfaces the question of whether the type of decision matters in eliciting a longer-time perspective. Most studies of corporate governance are agnostic to the strategic decision being made. Prior studies have shown that the temporal frame of the decision is important in long-term investments in, for example, research and development (Hoskisson *et al.*, 2002), physical capital (Larcker, 1983) and corporate social responsibility (Johnson and Greening, 1999; Wang and Bansal, 2012). However, additional studies have shown that the temporal dimensions of strategic decision-making are particularly important with respect to environmental issues, because of the concerns associated with intergenerational equity (Bansal and DesJardine, 2014;

Wade-Benzoni, Sondak and Galinsky, 2010). We argue that at least part of the reason managers are exhibiting longer time horizons is because of the nature of the decision, which evokes concerns about the health of future generations.

This paper's structure continues with the presentation of the research's theoretical framework and tests of related hypotheses. Our baseline hypothesis is that the CEO's career horizon, tenure, ownership of the firm and compensation design embody a perspective of time; these governance characteristics of a corporation shape the CEO's future time perspective and, ultimately, the corporation's environmental investments.

Theoretical background

Management literature and individuals' time perspective

An individual's time *perspective* reflects how an individual experiences time, and influences how an individual's actions are patterned over time (Wang and Bansal, 2012). An individual's time perspective comprises both temporal focus and temporal depth (Zimbardo and Boyd, 1999). Temporal *focus* refers to the relative importance that individuals attach to the past, present and future. For example, actors who have a future time perspective place more value on the future than on the present or past (Bluedorn, 2002). Temporal *depth* refers to the temporal distance – how far back into the past or how far ahead into the future – that individuals consider when contemplating events that have happened, may have happened, or have yet to happen (Bluedorn, 2002). Actors who have a future time focus with long temporal depth anchor their attention in the distant future.

Previous studies have found that firms focused on a more distant future in their planning and strategic decisions tend to have positive outcomes, such as greater innovation and firm performance (Das, 2006; Flammer and Bansal, 2017). Researchers have highlighted that US firms tend towards 'short-termism' (Laverty, 1996; Porter, 1992) because they are either unwilling or unable to make the long-term investments necessary for future growth. Such short-termism is argued to place US firms at a competitive disadvantage relative to their overseas competitors (Porter, 1992). This temporal orientation reflects intertemporal choice problems, in which managers choose nearer-term returns over more distant returns, which means that they are less likely to be the corporate investments needed for research and development (R&D), product innovation or new facilities.

Most of the previous management literature around intertemporal choice problems is directed at generic firm-level outcomes and their performance implications, such as innovation and firm performance (Das, 2006). In these situations, economic rationality suggests that decisions may easily be made by discounting future benefits and comparing them with original investments. Very limited research has analysed a firm's decisions that have societal implications (notable exceptions are Flammer and Bansal, 2017; Slawinski and Bansal, 2015). But for managers, there is often a contest between what is good for the firm in the short term and what is good for society in the long term (Bansal and DesJardine, 2014). Understanding these decisions requires that attention be paid to the managers' time perspective and values, because these decisions cannot be justified purely on economic grounds. We argue that CEO characteristics and corporate governance variables embody a perspective of time that is particularly salient to decisions that have long-term societal consequences, such as those pertaining to the natural environment.

Time and environmentally responsible technologies

Long-term environmental investments have high benefits for society beyond an organization's boundaries, but the economic outcomes are often unknown or risky, at least in the short term (Bansal, 2005; Ortiz-de-Mandojana and Bansal, 2016). Pollution reduction, fuel diversity and other indirect economic benefits of renewables accrue to society as a whole, although firms must cover most of the investment and deal with the additional risks associated with technological change.

We state that managerial decisions that involve long-term societal outcomes, such as those addressing environmental issues, are more subject to cognitive biases, beliefs, knowledge, assumptions and personal values (Cyert and March, 1963). Studies have shown that a CEO's personal preferences, expertise, activism, power or values influence organizational commitments to corporate social responsibility practices (Chatterji and

Toffel, 2017; Chin, Hambrick and Treviño, 2013; Lewis, Walls and Dowell, 2014; Walls and Berrone, 2017). For example, Walls and Berrone (2017) propose that CEOs have a greater ability to influence their company's environmental practices when they have experience in addressing environmental matters, and leverage their formal influence over the board of directors and the top management team (Walls and Berrone, 2017). The strong influence of managers' characteristics and values on environmental decisions reinforces the importance of studying the decision processes of organizational participants in these situations (Flannery and May, 2000).

Interest is growing among researchers in the role of managers' time orientation on environmental decision making. For example, Slawinski and Bansal (2012) show that an individual's temporal perspective shapes firm-level environmental decisions. These authors identify two categories of corporate responses to climate change grounded in different temporal perspectives: focused and integrated. Focused firms emphasize linear time, which is manifest in a lower tolerance for uncertainty. This linear view of time emphasizes less complex solutions and creates path dependency in the firm's capability development. In contrast, integrated firms see time as cyclical and events as being connected over time. These firms relied not only on metrics, but also on qualitative information. They were more tolerant of uncertainty, as their work involved numerous stakeholders and many contingencies. In contrast to focused firms, integrated firms saw making investments ahead of regulatory certainty as being less risky. As a result, 'integrated firms developed a broad range of responses, including investments in alternative energies, multi-stakeholder dialogue, and energy efficiency' (Slawinski and Bansal, 2012, p. 1554). Similarly, Wang and Bansal (2012) argue that entrepreneurs have different time perspectives, and those with a longer time perspective are more likely to invest in socially responsible activities and to profit from those investments.

The salience of environmental externalities reinforces the need for managers to consider not only the long-term financial implications of their decisions but also the social challenges and risks related to energy sources. The use of fossil fuels, such as coal, oil and natural gas, for electricity imposes a societal cost. Fossil fuels release greenhouse gases and other toxins that contribute to climate change and pollute the air, water and land, while also consuming large amounts of water and compromising plant and animal life. Similarly, generating electricity through nuclear energy poses serious safety risks.

Carbon can be reduced through a diverse range of strategies with different time horizons. For example, carbon emissions can be reduced by improving the efficiency of the organization's operations. The advantage of such an approach is that costs and environmental impacts are lowered simultaneously and relatively quickly; however, the disadvantage is that the underlying environmental harm is not addressed, as a minimum environmental impact is always incurred (Slawinski and Bansal, 2015). Yet, electricity generated through renewable energy sources, such as solar, wind and thermal, produces relatively little or no pollution but incurs more short-term cost and market, production and policy risk.

Despite the social benefits of renewables, after the electricity market was deregulated, the cost–benefit and risk calculus for renewable energy generation was especially precarious for several reasons. First, the United States produced only about 12% of its national electricity from renewable energy sources in 1996, and most was from hydro. Only 2% of national electricity came from other sources, such as biomass, geothermal, wind or solar energy, which precluded any benefit from economies of scale (Nogee *et al.*, 1999). Second, renewable energies confronted commercialization barriers, including the lack of infrastructure, placing them at a competitive 'disadvantage against the entrenched industries' (Nogee *et al.*, 1999, p. 8). To illustrate, companies could take several years to identify publicly acceptable wind sites with good resources and access to transmission lines. Furthermore, companies understood the permitting and reviewing procedures for conventional energy technologies, but the permitting processes for renewables involved new issues, ecosystem impacts and standards, which often led to unexpected delays. Financing was both more challenging and costlier for the developers of renewable resources, as financial institutions were generally unfamiliar with the new technologies and considered them relatively risky. These high financing costs especially damaged the competitive position of renewable energy generation, since 'renewables generally require higher initial investments than fossil fuel plants, even though they have lower

operating costs' (Nogee *et al.*, 1999, p. 19). Third, companies required retooling to switch to renewable technologies, which would almost certainly involve infrastructure and learning costs that would not be incurred by expanding the use of existing energy sources. (See Nogee *et al.*, 1999 for an extended review of the costs and risks of generating electricity from renewable sources.)

Even now, most of the installed capacity is based on energy generated from fossil fuels (The Economist, 2017), which illustrates the sustained high risk associated with the switch to renewables. According to Tietjen, Pahle and Fussb (2016), the investment risks for power plants arise mainly because the need for future cash flows to cover the capital expenditures (mostly investment costs) depends largely on risky electricity prices (a revenue risk) and risky fuel and carbon prices (variable cost risks). Firms operating with traditional technologies have high variable costs (i.e. fossil fuel prices) and relatively low fixed costs, as they need few additional investments to continue producing electricity. These firms can pass the fluctuations in variable costs through to the consumer by raising the electricity price. Renewable energy generation, in contrast, does not exhibit such a correlation between costs and revenues (Tietjen, Pahle and Fussb, 2016). If the energy price decreases because the coal price decreases, firms investing in generating electricity from renewable resources will still need to cover the cost of the new technologies. Thus, although the level of risk is strongly affected by the overall capacity mix of the market, renewable plants face the highest stand-alone risks, since their profits are most affected by the risk associated with fluctuations in electricity prices (Tietjen, Pahle and Fussb, 2016).

After the US electricity-generating industry was deregulated, the challenges of moving to renewables for electricity generation was greater than before deregulation, because the 'failure of the market to value public benefits like environmental protection and fuel diversity, as well as market barriers, will make it hard for relatively new technologies to become commercialized and enter the mainstream marketplace' (Nogee *et al.*, 1999, p. 44). In spite of this uncertainty and the prolonged time scales involved, some companies were investing in generating electricity from renewable resources (Delmas, Russo and Montes-Sancho, 2007; Ortiz-de-Mandojana and Aragón-Correa, 2015). In the next section, we offer time-related corporate governance variables that can explain why.

Hypotheses

CEO career horizon

A CEO's career horizon is the amount of time the CEO has until retirement (Krause and Semadeni, 2014; Matta and Beamish, 2008; McClelland, Barker and Oh, 2012). Based on both prospect theory and agency theory, prior studies have argued that CEOs closer to retirement are less likely to make major strategic investments because they are unlikely to reap the financial rewards of their investments (Barker and Mueller, 2002; Matta and Beamish, 2008). However, these studies did not consider the influence of career horizon on decisions with long-term societal implications, such as decisions related to environmental performance. In such situations, we state that CEOs with shorter career horizons are more likely to make risky investments for several reasons.

First, people's time perspective tends to become longer over their lifetime. As people age, they tend to look farther into the future and past (Fung, Lai and Ng, 2001; Zimbardo and Boyd, 2008). Zimbardo and Boyd (1999) conducted exploratory and confirmatory factor analysis of individual time perspectives and found that age positively correlated with a factor that mirrored a future perspective. A time perspective is formed through an unconscious process; personal and social experiences flow continuously to instil a sense of order, coherence and meaning (Zimbardo and Boyd, 1999). The process of aging, although biological, carries important social meanings, culturally imbued expectations for behaviour, and socially defined needs and priorities (Lowry, 2009; Troy, Smith and Domino, 2011).

As people age, they have a longer period of time over which they can look back (Bluedorn, 2002; El Sawy, 1983). Prior research has found a positive correlation between the distance that people look back into the past and the distance that they look into the future (Bluedorn, 2002; El Sawy, 1983). This time perspective exerts a dynamic influence on many important judgments, decisions and actions (Zimbardo and Boyd, 1999). Although people with shorter career horizons will still apply a

rational economic view to firm-specific decisions that have mostly business implications, people who have a greater temporal depth are more likely to accommodate a wider set of factors in their decision-making (Taylor, 1975). With this wider set of considerations, CEOs with a future time perspective are more likely to acknowledge a wider set of opportunities and threats, such as those pertaining to society or the natural environment.

A second reason why a CEO's shorter career horizon will contribute to a greater commitment to the generation of renewable energy is because as executives age, they prioritize their emotional needs (Carstensen, Fung and Charles, 2003), which also contributes to a greater future focus. This shift is clearly seen with age, yet has also been shown to exist in other contexts in which time horizons shrink, such as during periods of geographic relocation, illness and war, all of which compromise people's subjective sense of future time (Carstensen, Fung and Charles, 2003; Cheng and Yim, 2008; Lang and Carstensen, 1994). As people age, they attach less importance to goals that expand their horizons and greater importance to goals from which they derive emotional meaning (Carstensen, 2006; Mather and Carstensen, 2003). This theory has been empirically supported by the effects of timeliness in worker motivation and in the creativity of organizational members (Mainemelis, 2001; Stamov-Roßnagel and Hertel, 2010). Maturity has also been associated with higher levels of moral development and stricter interpretations of a firm's ethical standards of conduct (Serwinek, 1992), resulting in less likelihood of engaging in or facilitating unethical behaviours such as accounting fraud (Troy, Smith and Domino, 2011).

Wade-Benzoni, Sondak and Galinsky (2010) support the argument that CEOs are less self-interested and more socially concerned as they edge closer to retirement. Wade-Benzoni, Sondak and Galinsky (2010) found that under conditions that define intergenerational allocations – in which the present generation can potentially impose large and not easily reversed long-term consequences on future generations – CEOs become more concerned with legacies, ethics and responsibilities, which temper and even trump self-interests. Progeny affects the imaginability of future generations, which, in turn, increases individuals' affinity with future generations and brings the outcomes of future generations closer to one's self (Wade-Benzoni, 1999). This proposition translates into the following hypothesis in our specific research project.

> *H1:* The shorter the CEO's career horizon, the greater the firm's share of environmentally responsible technologies.

CEO tenure

A CEO's tenure also influences the CEO's time perspective and approach to environmental decisions. Previous literature focusing on long-term business opportunities has argued that longer-tenured executives tend to become more rigid because they rely on past experiences instead of new stimuli (e.g. Hambrick and Fukutomi, 1991). However, we suggest that longer tenure widens CEOs' cognitive frame on socially responsible investments so that they are more open to social and environmental stimuli. We offer several arguments to support this assertion.

First, CEOs with longer tenures (i.e. those who have been working within the firm for a longer period) have greater temporal depth because they have been exposed to more different events in their firms, and those experiences can be helpful when making present-day decisions that impact the future. For example, El Sawy (1983) found that planning horizons lengthened when executives were asked to look first to the distant past of their own personal organizational history and then to the future. Thus, CEOs' longer personal vision of the historical evolution of the firm and their understanding of the long-term benefits gained by environmental commitments in past decades may be especially useful in understanding the future societal importance of firms' environmental decisions today. Additionally, a CEO's tenure relates to that individual's knowledge of the organizational culture. In other words, the longer CEOs have been with the company, the better they know the organizational strategy and operations, the key influencers and resource holders, and therefore the best approaches to innovation.

Second, a short CEO tenure belies a future perspective because managers are likely to act opportunistically in the short term to signal their suitability to external labour (Laverty, 1996). That is, managers are motivated to select projects with short-term returns in an attempt to convince the labour market of their strong managerial abilities (Campbell and Marino, 1994; Kor, 2006).

These executives, therefore, tend to ignore projects that help the firm primarily in the long run, such as those that positively impact the natural environment.

Consistent with this argument, Porter (1992) looked to executives' tenure when he studied the problem of short-termism among US firms. He observed that Japanese managers were less short-sighted than their American counterparts. Japanese managers tended to be internally promoted career employees, who usually spent their careers with one company, and inter-firm mobility was almost non-existent. This tendency for Japanese managers to remain in their current job encouraged long-range investments (Campbell and Mariano, 1994; Porter, 1992). Indeed, in the past 20 years, the average US CEO's tenure has decreased from approximately eight years to less than four years, a change that has been linked to an increase in pressure on CEOs to deliver quick results (Antia, Pantzalis and Park, 2010). In general, we propose:

> *H2:* The longer the CEO's tenure, the greater the firm's share of environmentally responsible technologies.

CEO ownership of the firm

CEO ownership of the firm helps to increase the CEO's identification with the firm and is more likely to lead to decisions that build stability and a future perspective. We offer two explanations.

First, managerial ownership fosters socio-emotional wealth (Berrone *et al.*, 2010). Prior research has shown that when CEOs are also shareholders, they tend to identify more with the firm and internalize the firm's image as their own (Thomsen and Pedersen, 2000). Given this association between image and identity, CEOs will likely want to avoid tarnishing their firm's image, which would challenge their own identity. These CEOs are likely to think about their legacy and how they will be remembered, as they have built such a strong emotional connection to the firm. They will see how each decision connects both to other decisions and to a collective destiny for the firm over the long term.

In a second mechanism, ownership fosters a future time perspective through a lack of incentives to develop strategies that will have an immediate impact on short-term firm prices. CEOs face difficulties profiting from short-term stock market movements, as they are unable to liquidate their ownership quickly. Although speculative traders and other shareholders can move quickly between companies (NYSE, 2010), CEOs cannot because a massive sell-off would send negative signals to other shareholders and to stakeholders. For these reasons, we anticipate that CEOs with high ownership of the firm are more likely to invest in environmentally responsible technologies. Specifically, we hypothesize:

> *H3:* The greater the CEO's ownership of the firm, the greater the firm's share of environmentally responsible technologies.

CEO compensation

Executive compensation is an important mechanism for orienting management decisions (Gerhart and Milkovich, 1990; Gomez-Mejia and Wiseman, 1997; Miller, Wiseman and Gomez-Mejia, 2002). Earlier research has shown that the design of CEOs' compensation affects their temporal orientation in making organizational decisions. For example, Larcker (1983) found that firms that adopt long-term compensation policies experience statistically significant growth in capital investment compared with firms that do not. He argued that these compensation schemes lengthen the manager's decision-making horizon. More recently, Flammer and Bansal (2017) argued that managers are overly short-termist, so long-term compensation plans will change managerial behaviour. Through a differences-in-differences research design, corporations that pass shareholder resolutions for long-term compensation plans showed higher corporate social responsibility, greater R&D, long-term operational performance and greater use of long-term language relative to those that do not accept such shareholder resolutions.

In the environmental arena, Berrone and Gomez-Mejia (2009) found that long-term pay was an important incentive for pollution prevention, and it was more effective where it is needed the most – that is, in highly polluting industries. Their results suggest that a firm with poor environmental performance should increase the proportion of long-term pay in the CEO compensation package. Russo and Harrison (2005) also found that a link between plant manager compensation and environmental performance elicits a reduction in emissions.

Based on this prior research, we expect that compensation plans that focus on short-term performance will reduce investments in environmentally responsible technologies, and this effect would be especially true in industries that are normally long term, such as the electricity-generation industry. Short-term compensation is reflected in bonuses based on current-year performance. Larcker (1983) argued that annual bonuses push CEOs to focus on the present. Short-termism, which is defined as the excessive focus of corporate managers on short-term results, repudiates concern for long-term value creation and the fundamental value of firms (Stiglitz, 1989) and society. Short-term actions include decreasing discretionary expenses and underinvesting in long-term assets (Lee, Matsunaga and Park, 2012; Waegelein, 1988). The capital investments needed for such discretionary investments, such as environmentally responsible technologies, will be delayed or even dismissed because profits in the current year will be reduced, which will compromise the CEO's bonus. Given that renewable energy generation requires additional risks and investments in the short term (Nogee *et al.*, 1999; Tietjen, Pahle and Fussb, 2016), we predict that:

> *H4:* The greater the CEO's short-term compensation pressures, the smaller the firm's share of environmentally responsible technologies.

Methods

Sample

We collected data for a three-year period from utilities generating, transmitting and distributing electricity for public use in the United States. Information about the environmental situation and the utilities' electricity generation was drawn from three databases: (1) the Energy Information Administration (EIA), for information regarding each state's deregulations and renewable portfolio standard measures; (2) the Toxics Release Inventory, which records the level of emissions in states where the firms operate; and (3) the eGRID database, which offers environmental information at the firm level. We improved the reliability of results by analysing data not from one year but from three years. In selecting three years for data, we chose those years that could provide a range of values over time yet also allow previous years' data to act as control data. As a result, we chose to analyse data for 1997, 2000 and 2005, with lagged variables from 1996, 1999 and 2004, respectively.

Financial information was obtained from Standard & Poor's Capital IQ database (www.capitaliq.com/ciqdotnet/login.aspx). Corporate governance data came from the EDGAR database, which contains publicly accessible documents of companies bound by law to disclose financial information to the US Securities and Exchange Commission (SEC). CEO career horizon, tenure, ownership and compensation data were obtained from proxy FORM 10-K and FORM DEF 14A for the fiscal years 2004, 1999 and 1996 (US Securities and Exchange Commission, 2013).

We first drew our sample from all investor-owned US electric utilities in the eGRID database from the years 1997, 2000 and 2005. These data yielded 126 different firms, though during the period of analysis (1996–2005), the US electric utilities industry experienced structural changes, including mergers, acquisitions and failures. As a result, not all firms spanned all three years in our panel. Due to data availability, our final sample comprised 81 of these firms (64.3% of the population analysed) and 150 observations in the three-year unbalanced panel. We excluded federally owned, and other publicly and cooperatively owned firms, as we recognize that these other forms of ownership hold very different priorities.

Dependent and independent variables

Environmentally responsible technologies. For the dependent variable, we measured the share of electricity generated from renewable sources (US EPA, 2010) relative to total electricity generation. We calculated this ratio for one year following the year in which the data were collected for the independent variables. eGRID has data available for t + 1 for all years analysed (i.e. 1996, 1999 and 2004).

CEO career horizon. We measured *CEO career horizon* as the number of years remaining before the CEO reached the assumed retirement age of 70, which is consistent with the measures used by Krause and Semadeni (2014), Matta and Beamish (2008), McClelland, Barker and Oh (2012). CEO age was extracted from the proxy Form10-K for the fiscal years 2004, 1999 and 1996. We calculated CEO age at the beginning of the reference year.

CEO tenure. We measured CEO tenure by calculating the years since the CEO's appointment at the firm. This information was drawn from proxy Form10-K for the fiscal years 2004, 1999 and 1996.

CEO ownership. We measured CEO ownership by calculating the shares held by the CEO as a percentage of total shareholdings. This information was drawn from proxy Form10-K for the fiscal years 2004, 1999 and 1996.

Short-term CEO compensation. We define this variable as the share of annual compensation that pressures the CEO to pursue short-term goals – that is, the ratio of annual bonuses to annual fixed salary. This information came from the executive compensation table in proxy DEF14A for the fiscal years 2004, 1999 and 1996.

Control variables

We included variables in the model to control for additional factors that might partly explain firms' renewable energy generation. *Financial profitability* may be associated with the attention extended to environmental issues and to whether such issues are considered to pose an opportunity (Sharma, 2000). We measured financial profitability as firms' return on assets from the previous year. *Organizational size* is related to proactive environmental actions (e.g. Aragón-Correa, 1998). We measured firm size as the total net generation of energy in megawatts per hour and used the square root to correct normally. We also controlled for *firm age*, which refers to the number of years since the firm's incorporation date. To take into account any possible differences among the *years* in the sample, we used *Year00*, which is a categorical variable that takes the value 1 for the year 2000 and 0 for all other years, and *Year05*, a variable that takes the value 1 for the year 2005 and 0 for all other years.

Governance control variables were extracted from proxy Form10-K for the fiscal years studied, and included *Separate chair*, which was 0 when the CEO and chair were the same person and 1 when they were not. Previous studies have suggested that CEO duality affects environmental and social practices (Lattemann *et al.*, 2009; McKendall, Sánchez and Sicilian, 1999). *Board size* refers to the number of directors on the board. Kassinis and Vafeas (2002) found that a larger board size was negatively related to board effectiveness when dealing with environmental issues. We calculated *Board career horizon* as the average of the number of years remaining before the directors reached the assumed retirement age of 70. *Board tenure* was calculated as the average number of years that the directors of the company have held their positions. Finally, we used a dummy variable to control for the presence of *larger shareholders*, which can affect investment in different dimensions of corporate social responsibility (e.g. Johnson and Greening, 1999). This variable took the value 1 when investors held more than 5% of the company's shares, and 0 otherwise.

We also controlled for environmental regulation and other considerations that could affect the firm's emissions. To register the effect of *deregulation*, we followed Delmas and Tokat (2005) and Delmas, Russo and Montes-Sancho (2007), who created a variable taking the value of 1 when a retail deregulation had been enacted or a regulatory order had been issued, and 0 otherwise (US Energy Information Administration, 2010). We also included the variable *renewable portfolio standard in place* to capture the effect of operating in a state with an established renewable portfolio standard (RPS) (Lawrence Berkeley National Laboratory, 2008). This variable took the value 1 when a state had enacted a RPS, and 0 otherwise. For multistate utilities, the variables *deregulation* and *renewable portfolio standard in place* were weighted based on the percentage of electricity generated within each state by the firm.

Data analysis

To test the model, we used time-series cross-sectional data analysis. This method is superior to analysing single-period cross-sectional data because it controls for the confounding effect of time-invariant and company-specific variables (Wiersema and Bowen, 1997). The results of the Hausman specification test suggested that a random-effects model was appropriate ($\chi^2 = 20.15$; $p > 0.1$; H_0 = random effect is the efficient estimator). Additionally, we clustered the standard errors by firm to obtain results that are robust with correlation within firms across time.

Results

Table 1 reports descriptive statistics and correlations for the variables examined in our study.

Table 1. Descriptive statistics and correlations of variables[a]

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Env. responsible technologies	8.57	20.75															
2. Financial profitability	3.03	2.43	−0.02														
3. Size	4.83	3.35	−0.27***	0.00													
4. Previous emissions	0.79	0.32	−0.56***	0.01	−0.10												
5. Separate CEO	0.18	0.39	0.21**	−0.06	−0.10	−0.10											
6. Board career horizon	10.29	2.81	0.12	0.03	−0.17*	0.03	0.05										
7. Board tenure	8.14	2.56	−0.09	−0.11	−0.11	0.18*	−0.22**	−0.34***									
8. Board size	11.10	2.31	−0.12	−0.04	0.31***	−0.14†	−0.10	−0.09	−0.04								
9. Large shareholders	0.65	0.48	−0.09	−0.20**	0.13†	−0.10	0.12	−0.04	−0.21**	0.06							
10. Firm age	47.33	39.90	0.26**	0.07	−0.10	−0.11	−0.07	0.04	−0.01	−0.12	0.02						
11. Deregulation	0.39	0.44	0.14†	−0.04	−0.01	−0.34***	0.14†	−0.10	−0.26**	−0.02	0.23**	0.14†					
12. RPS	0.29	0.39	0.04	−0.09	−0.12	−0.17*	0.02	−0.06	−0.06	−0.18*	0.26**	0.15†	0.54***				
13. CEO career horizon	14.33	5.77	−0.10	−0.14†	−0.14†	0.14†	0.32***	0.22**	−0.02	−0.18*	0.01	0.07	−0.05	−0.00			
14. CEO tenure	4.97	4.26	0.04	−0.21**	−0.13†	0.01	−0.23**	0.02	0.20**	−0.06	0.03	−0.06	0.00	0.26**	−0.25**		
15. CEO ownership	0.70	3.16	0.45***	−0.06	−0.17*	−0.28***	0.04	0.08	−0.18*	−0.21**	0.11	−0.05	0.16*	0.26**	−0.12	0.13†	
16. Short-term compensation	1.29	4.54	−0.04	−0.07	−0.04	−0.06	0.04	0.03	0.01	−0.09	−0.06	−0.05	0.04	0.07	0.04	−0.04	0.01

[a]The table contains Pearson's correlation coefficient (n = 150). †p < .1; *p < .05; **p < .01; ***p < .001.

Results from the random-effects GLS regression analyses are listed in Table 2. Model 1 presents the results of regression with the control variables, and serves as a baseline model. According to our results, smaller firms and firms with previous low emissions scores generated a higher percentage of energy from renewable sources than their larger and higher-scoring counterparts. Thus, for our sample of investor-owned companies in the period of analysis, size is found to negatively affect the level of renewable generation. In Models 2–5, having a separate CEO relates positively with the percentage of energy from renewable sources, which supports previous studies suggesting that CEO duality has a negative effect on environmental and social practices (Lattemann *et al.*, 2009; McKendall, Sánchez and Sicilian, 1999). For example, McKendall, Sánchez and Sicilian (1999) argue that a chair who is not a CEO is less pressured to produce positive short-term outcomes than a chair who is also a CEO. In these situations, the chair who is not a CEO is more likely to recognize the undesirable long-term social and financial liabilities associated with non-compliance. Finally, older firms generate a higher percentage of energy from renewable sources.

Models 2–5 progressively include the independent variables of our analysis. The Wald test was used in all models to understand improvements that resulted from the incorporation of variables in each step. We also calculated the variance inflation factor (VIF) after each regression; values were within acceptable limits for all control and independent variables. Model 5 includes the full model.

Hypothesis 1 proposed that the CEO career horizon is negatively related to a firm's environmentally responsible technologies. Model 5 shows that the coefficient of the variable representing CEO career was negative and significant ($z = -2.31$, $p = 0.021$), indicating that firms whose CEOs have a shorter career horizon invested in a higher percentage of renewable energy generation. Therefore, Hypothesis 1 is supported.

The coefficient capturing CEO tenure was not significant. Therefore, for the sampled firms, we cannot accept Hypothesis 2, which proposed that firms led by CEOs with longer tenures would demonstrate more environmentally responsible technologies than firms led by CEOs with shorter tenures.

Hypothesis 3 suggested that firms led by CEOs who own more of the firm would demonstrate more environmentally responsible technologies than firms led by CEOs who own less of the firm. Model 5 shows that the coefficient of the variable representing CEO ownership was positive and significant ($z = 7.30$, $p = 0.000$), which confirms Hypothesis 3.

Finally, Hypothesis 4 advocated that firms led by CEOs who receive larger short-term compensation would demonstrate a smaller share of environmentally responsible technologies. Model 5 shows that the coefficient of the variable representing CEO short-term compensation was negative and significant ($z = -1.96$, $p = 0.050$), which confirms Hypothesis 4.

Robustness checks

Considering the size of our sample and the high number of parameters we estimated, we checked whether our main results were affected by a subset of variables. We repeated our analysis considering only significant variables instead of the entire list, and we obtained the same results as in the study's original model.

We also repeated our analysis by dropping the oldest observations (i.e. data for 1996) to verify whether our results were sensitive to the temporal evolution of the analysed effects. We obtained similar results and confirmed the same findings in our original model. Only the variable for short-term compensation reduced its significance level, but it maintained the direction of the predicted results. The smaller size of the sample may explain the drop in the significance level.

These additional analyses confirm that our models are consistent with the assorted control variables, that the proportion parameters we estimated and the number of observations are not problematic, and that our results are stable over time. We have provided detailed results to our reviewers; these results are also available to any interested readers upon request from the authors.

Discussion

Prior research has shown that corporate governance plays a significant role in strategic decisions, but this prior work is agnostic to the temporal implications of the dependent variable. In this paper, we focus on a strategic decision, specifically the investment in environmentally responsible

Table 2. Results of random effects GLS regression[a]

	Model 1		Model 2		Model 3		Model 4		Model 5	
Control variables										
Financial profitability	−0.13	(0.35)	−0.27	(0.35)	−0.22	(0.39)	−0.12	(0.39)	−0.21	(0.39)
Size	−1.70***	(0.64)	−1.66**	(0.57)	−1.64**	(0.59)	−1.28*	(0.50)	−1.30**	(0.50)
Previous emissions	−35.18***	(7.31)	−33.94***	(6.50)	−33.81***	(6.57)	−29.04***	(6.18)	−29.68***	(6.19)
Separate CEO	6.90	(4.66)	10.92*	(5.18)	11.20*	(5.44)	11.43*	(4.91)	11.44*	(4.88)
Board career horizon	0.63	(0.56)	0.88	(0.63)	0.81	(0.64)	0.67	(0.62)	0.70	(0.62)
Board tenure	0.14	(0.66)	0.25	(0.64)	0.20	(0.63)	0.53	(0.56)	0.53	(0.55)
Board size	−0.62	(0.55)	−0.81	(0.57)	−0.79	(0.57)	−0.36	(0.53)	−0.43	(0.54)
Large shareholders	−0.57	(2.44)	−0.51	(2.36)	−2.44	(2.36)	−3.09	(2.51)	−3.47	(2.55)
Firm age	0.07	(0.05)	0.08	(0.05)	0.08	(0.05)	0.11**	(0.04)	0.11**	(0.04)
Deregulation	−0.79	(4.10)	−2.05	(4.05)	−1.89	(4.05)	−1.49	(4.16)	−1.25	(4.16)
RPS	−1.96	(3.99)	−1.80	(4.04)	−2.32	(4.10)	−6.38†	(3.67)	−6.25†	(3.61)
Year 2000	0.87	(3.90)	1.85	(3.46)	1.92	(3.37)	2.20	(3.14)	1.84	(3.17)
Year 2005	1.55	(2.78)	1.30	(2.68)	1.24	(2.68)	1.21	(2.37)	1.04	(2.30)
Direct effects										
CEO career horizon			−0.66*	(0.27)	−0.61*	(0.27)	−0.51*	(0.21)	−0.51*	(0.22)
CEO tenure					0.18	(0.36)	0.16	(0.35)	0.13	(0.35)
CEO ownership							2.05***	(0.26)	2.02***	(0.28)
Short-term compensation									−0.31*	(0.16)
Constant	41.94*	(20.19)	48.12*	(19.52)	46.98*	(20.01)	31.98†	(17.28)	34.04*	(17.41)
R^2 overall	0.50		0.53		0.53		0.61		0.62	
Wald chi^2 (df)	80.80***	(13)	83.52***	(14)	83.85***	(15)	3064.82***	(16)	3437.96***	(17)
Chi^2 ΔR^2			6.01*	(1)	0.25	(1)	55.03***	(1)	3.86*	(1)

[a]n = 150. The table contains unstandardized regression coefficients. SEs clustered on firm are shown in parentheses. Environmentally responsible technologies is the dependent variable. Significant at †p < .1, *p < .05, **p < .01 and ***p < .001.

technologies, which requires a future time perspective. We hypothesized that a CEO's career horizon, tenure, ownership of the firm and compensation design are related to such investments because they shape the CEO's time perspective.

We tested our hypotheses on 150 observations from the US electric utilities sector over a three-year unbalanced panel, using random-effects GLS analysis. We confirm that a CEO's short career horizon, higher ownership and low level of short-term compensation foster a future time perspective, which leads to a higher percentage of electricity generation from renewable sources.

Prior research argues that CEOs close to retirement are unlikely to make long-term investments because they tend to be more risk-averse than their counterparts (Barker and Mueller, 2002; Matta and Beamish, 2008). However, whereas these studies investigated outcomes with firm-specific benefits, we analysed the relationship between CEO career horizon and corporate investments that have societal implications. Whereas investments that have firm-specific benefits often lead to foreseeable short-term outcomes, most societal investments require a future perspective because of their long-term returns.

Any investment has risk; however, during our research frame (1996 to 2005), investments in renewable electricity generation were highly risky, given the uncertainty of US public policy in carbon pricing and the high prices associated with renewable energies. During the period of analysis, renewable electricity generation required significant investments and therefore was considered to be risky for organizations (Finon, 2013; Nogee *et al.*, 1999). Even now, most of the installed capacity is based on energy generated from fossil fuels (The Economist, 2017), which illustrates the sustained high risk associated with the switch to renewables.

Our results show that, compared with their younger counterparts, CEOs closer to retirement are more likely to assume additional risks and to make environmentally responsible decisions. CEOs with shorter career horizons are also more likely to acknowledge the wider set of opportunities and threats associated with environmental issues. Their future time perspective exerts a dynamic influence on their judgments, decisions and actions (Bluedorn, 2002; Zimbardo and Boyd, 1999). Furthermore, as executives age, they tend to prioritize their emotional needs, relative to other needs such as compensation and career advancement (Carstensen *et al.*, 2003), and tend to have higher levels of moral development and stricter interpretations of the firm's ethical standards of conduct (Serwinek, 1992; Troy, Smith and Domino, 2011), which also contribute to a greater future focus. This result supports previous studies' findings that having an older management could, in certain situations, have a positive effect. For example, Troy, Smith and Domino (2011) found that, as CEOs age, they are less likely to engage in or facilitate unethical behaviours such as accounting fraud.

We also found that CEO ownership had a positive effect on the level of renewable energy generation. A CEO's ownership typically increases the CEO's identification with the firm, implying a more stable and long relationship with the firm and fostering a future time perspective. Previous studies have mainly analysed ownership as a mechanism for aligning the incentives between principal and agent (e.g. Walters, Kroll and Wright, 2008; Wright *et al.*, 1996; Zahra, Neubaum and Huse, 2000). We argue that CEO ownership also increases CEOs' future time perspective, which can help to align CEOs' interests with the future environmental implications of their decisions for society (even when these interests do not necessarily coincide with the principals' interests).

Additionally, we show that CEOs with a low level of short-term compensation are related to higher environmentally responsible technologies. This result confirms the importance of considering compensation extremes to avoid sending the wrong signals to CEOs in terms of environmental decisions. Thus, we see a connection between short-term pressures and temporal myopia. Our findings support studies that find that the CEOs who are pressured to perform well in the short term tend to underinvest in long-term assets (Lee *et al.*, 2012; Waegelein, 1988).

Contrary to our expectations, we did not find that CEO tenure affected the use of environmentally responsible technologies. The predicted relationship may not have been significant because of the very specific features of our sample of US electric utilities. First, the vast majority of the CEOs in our sample already had long tenure, so the variance in this variable was low and there were few observations of shorter-tenured CEOs. Second, it may very well be that there is a countervailing

force with CEOs with long tenure. CEOs with long tenure may rely more on existing routines because of their knowledge of the sector and the firm, and are less receptive to new information and more rigid to change, which could potentially represent less attention to new technologies (Hambrick and Fukutomi, 1991). We leave this and other limitations for future researchers to explore further, as we discuss in the next section.

Limitations and future research directions

Several limitations of this study warrant discussion. First, we restricted our managerial focus to CEOs and did not examine the time perspective of the entire top management team. Despite a variety of significant contributions examining executive groups, rather than individuals (Hambrick, 2007), CEOs are still the most powerful executive agent in the organization and play a central role in this strategic decision.

Second, we analysed the effect of CEOs' time perspective within a single sector and a single national context. We restricted the variance in context to control the nature of the environmental investments being made. Had we not limited the sector and geography, the nature of the investment decisions on environmental performance may have differed so much that the outcomes of the analysis would have been difficult to interpret. However, this narrow focus has introduced limitations. We have a relatively small sample, but it is highly representative of the population (64.3%). As well, we do not know how generalizable our work is to other contexts. We encourage future researchers to further develop the theory in corporate governance to consider the implications for CEO time perspectives in other contexts.

Third, we also recognize that this specific industry leads to limitations. For example, the electric power generation industry, which has been highly regulated, experienced significant deregulation in the sampled years of this study. Consequently, the time perspective may have been more salient than in other more stable industries.

Finally, we use the share of electricity generated from renewable sources to capture the long-term option to react to pressures for renewable adoption; however, future studies could investigate the effects of other measures, such as investment in renewable energy capacity. Additionally, future studies could extend the period of analysis to determine whether the evolution of external factors may affect our conclusions.

We argue that a CEO's short career horizon, higher level of ownership and absence of short-term compensation pressure will foster a future time perspective, which leads to a higher percentage of electricity generation from renewable sources. Although previous literature supports our reasoning, we recognize the possibility of some alternative causality affecting the estimated relationships. For illustration, a firm that is more socially responsible might be more likely both to invest in green energy and to prioritize its best practices regarding corporate governance – such as long-term performance-related compensation for the top management team. In such a scenario, it would not be that the compensation arrangements led to the investments in renewable energy generation, but that both resulted from a firm's broader orientation. Future studies could thus analyse complementary relationships to those proposed in this study.

Implications for managers and policy makers

The findings from this study have important managerial implications. We find that a CEO's time perspective matters to environmental decisions. As previous corporate experiences show (e.g. Enron), adopting a short-term perspective may not be in the long-term best interests of the corporation. Our results can help managers to understand the influence of their time perspective on their decisions. Boards will be better poised, therefore, to scrutinize a tendency for some CEOs and senior executives to exhibit a short-term perspective and, thereby, fail to manage environmental risks.

US board members are older on average and stay in their post longer than their European counterparts, which calls attention to how leaders' characteristics affect investors' interests (Financial Times, 2016). Our research recognizes that critical differences likely exist in the way that senior executives make decisions with respect to firm-specific investments and environmentally beneficial investments. Even when demographic dimensions (e.g. career horizon or tenure) are unlikely to influence regular organizational operations, boards may want to include incentives that influence the CEO's time perspective to encourage decisions that are more environmentally sustainable.

Although we have focused on the effects of a future time perspective on environmental decisions, a future time perspective may also contribute to a more stable working environment for the firm. To the extent that people are made aware of their long-term impact on others, they are more likely to consider their legacy (Wade-Benzoni, Sondak and Galinsky, 2010). Codes of ethics that focus on the long-term, multi-generational nature of organizations may increase the likelihood of intergenerational beneficence (Wade-Benzoni, Sondak and Galinsky, 2010). It is likely that environmental sensibilities can be fostered, or attuned, under the enacted morality perspective (Fineman, 1997; Gonzalez-Benito and Gonzalez-Benito, 2005).

Conclusion

The importance of time in strategy research is likely to become even more salient with the increasing pressures towards short-termism. This paper shows that managers with a future time perspective are more likely, relative to their peers, to invest in long-term activities that benefit society – environmentally responsible technologies. A CEO's future perspective is fostered by a short career horizon, higher organizational ownership and absence of short-term compensation. We hope that this research will help to motivate even deeper insights into a time perspective on corporate governance, so that organizations can simultaneously meet the needs of business and society.

References

Antia, M., C. Pantzalis and J. C. Park (2010). 'CEO decision horizon and firm performance: an empirical investigation', *Journal of Corporate Finance*, **16**, pp. 288–301.

Aragón-Correa, J. A. (1998). 'Strategic proactivity and firm approach to the natural environment', *Academy of Management Journal*, **41**, pp. 556–567.

Bansal, P. (2005). 'Evolving sustainably: a longitudinal study of corporate sustainable development', *Strategic Management Journal*, **26**, pp. 197–218.

Bansal, P. and M. DesJardine (2014). 'Business sustainability: it is about time', *Strategic Organization*, **12**, pp. 70–78.

Barker, V. L. III and G. C. Mueller (2002). 'CEO characteristics and firm R&D spending', *Management Science*, **48**, pp. 782–801.

Berrone, P. and L. R. Gomez-Mejia (2009). 'Environmental performance and executive compensation: an integrated agency–institutional perspective', *Academy of Management Journal*, **52**, pp. 103–126.

Berrone, P., C. Cruz, L. R. Gomez-Mejia and M. Larraza-Kintana (2010). 'Socioemotional wealth and corporate responses to institutional pressures: do family-controlled firms pollute less?', *Administrative Science Quarterly*, **55**, pp. 82–113.

Bluedorn, A. C. (2002). *The Human Organization of Time*. Stanford, CA: Stanford University Press.

Campbell, T. S. and A. M. Marino (1994). 'Myopic investment decisions and competitive labor market', *International Economic Review*, **35**, pp. 855–875.

Carstensen, L. L. (2006). 'The influence of a sense of time on human development', *Science*, **312**, pp. 1913–1915.

Carstensen, L. L., H. H. Fung and S. T. Charles (2003). 'Socioemotional selectivity theory and the regulation of emotion in the second half of life', *Motivation and Emotion*, **27**, pp. 103–123.

Chatterji, A. K. and M. W. Toffel (2017). 'Do CEO activists make a difference? Evidence from a quasi-field experiment', Harvard Business School Working Paper, pp. 16–100.

Cheng, S. and Y. Yim (2008). 'Age differences in forgiveness: the role of future time perspective', *Psychology and Aging*, **23**, pp. 676–680.

Chin, M. K., D. C. Hambrick and L. K. Treviño (2013). 'Political ideologies of CEOs: the influence of executives' values on corporate social responsibility', *Administrative Science Quarterly*, **58**, pp. 197–232.

Cyert, R. M. and J. G. March (1963). *A Behavioral Theory of the Firm*. Englewood Cliffs, NJ: Prentice-Hall.

Das, T. K. (2006). 'Strategic alliance temporalities and partner opportunism', *British Journal of Management*, **17**, pp. 1–21.

Delmas, M. and Y. Tokat (2005). 'Deregulation, governance structures, and efficiency: the U.S. electric utility sector', *Strategic Management Journal*, **26**, pp. 441–460.

Delmas, M., M. V. Russo and M. J. Montes-Sancho (2007). 'Deregulation and environmental differentiation in the electric utility industry', *Strategic Management Journal*, **28**, pp. 189–209.

El Sawy, O. (1983). 'Temporal perspective and managerial attention: a study of chief executive strategic behavior', *Dissertation Abstracts International*, **44**, pp. 1556–1557.

Financial Times (2016). 'Research suggesting that directors among the oldest in utilities', https://ig.ft.com/sites/us-board-diversity/.

Fineman, S. (1997). 'Constructing the green manager', *British Journal of Management*, **8**, pp. 31–38.

Finon, D. (2013). 'The transition of the electricity system towards decarbonization: the need for change in the market regime', *Climate Policy*, **13**, pp. 130–145.

Flammer, C. and P. Bansal (2017). 'Does long-term orientation create value? Evidence from a regression discontinuity', *Strategic Management Journal*, **28**, pp. 1827–1847.

Flannery, B. L. and D. R. May (2000). 'Environmental ethical decision making in the U.S. metal-finishing industry', *Academy of Management Journal*, **43**, pp. 642–662.

Fung, H. H., P. Lai and R. Ng (2001). 'Age differences in social preferences among Taiwanese and Mainland Chinese: the role of perceived time', *Psychology and Aging*, **16**, pp. 351–356.

Gerhart, B. and G. T. Milkovich (1990). 'Organizational differences in managerial compensation and financial performance', *Academy of Management Journal*, **33**, pp. 663–691.

Gomez-Mejia, L. R. and R. M. Wiseman (1997). 'Reframing executive compensation: an assessment and outlook', *Journal of Management*, **23**, pp. 291–374.

Gonzalez-Benito, J. and O. Gonzalez-Benito (2005). 'An analysis of the relationship between environmental motivations and ISO14001 certification', *British Journal of Management*, **16**, pp. 133–148.

Hambrick, D. C. (2007). 'Upper echelons theory: an update'. *Academy of Management Review*, **32**, pp. 334–343.

Hambrick, D. C. and G. D. S. Fukutomi (1991). 'The seasons of a CEO's tenure', *Academy of Management Review*, **16**, pp. 719–742.

Hambrick, D. C. and P. A. Mason (1984). 'Upper echelons: the organization as reflection of its top managers', *Academy of Management Review*, **16**, pp. 193–206.

Hoskisson, R. E., M. A. Hitt, R. A. Johnson and W. Grossman (2002). 'Conflicting voices: the effects of institutional ownership heterogeneity and internal governance on corporate innovation strategies', *Academy of Management Journal*, **45**, pp. 697–716.

Johnson, R. A. and D. W. Greening (1999). 'The effects of corporate governance and institutional ownership types on corporate social performance', *Academy of Management Journal*, **42**, pp. 564–576.

Kassinis, G. and N. Vafeas (2002). 'Corporate boards and outside stakeholders as determinants of environmental litigation', *Strategic Management Journal*, **23**, pp. 399–415.

Kor, Y. (2006). 'Direct and interaction effects of top management team and board compositions on R&D investment strategy', *Strategic Management Journal*, **27**, pp. 1081–1099.

Krause, R. and M. Semadeni (2014). 'Last dance or second chance? Firm performance, CEO career horizon, and the separation of board leadership roles', *Strategic Management Journal*, **35**, pp. 808–825.

Lang, F. R. and L. L. Carstensen (1994). 'Close emotional relationships in late life: further support for proactive aging in the social domain', *Psychology and Aging*, **9**, pp. 315–324.

Larcker, D. F. (1983). 'The association between performance plan adoption and corporate capital investment', *Journal of Accounting and Economics*, **5**, pp. 3–30.

Lattemann, C., M. Fetscherin, I. Alon, S. Li and A. M. Schneider (2009). 'CSR communication intensity in Chinese and Indian multinational companies', *Corporate Governance: An International Review*, **17**, pp. 426–442.

Laverty, K. J. (1996). 'Economic "short-termism": the debate, the unresolved issues, and the implications for management practice and research', *Academy of Management Review*, **21**, pp. 825–860.

Lawrence Berkeley National Laboratory (2008). 'Renewables portfolio standards in the United States: a status report with data through 2007', http://eetd.lbl.gov/ea/ems/reports/lbnl-154e.pdf.

Lee, S., S. R. Matsunaga and C. W. Park (2012). 'Management forecast accuracy and CEO turnover', *The Accounting Review*, **87**, pp. 2095–2122.

Lewis, B. W., J. L. Walls and G. W. Dowell (2014). 'Difference in degrees: CEO characteristics and firm environmental disclosure', *Strategic Management Journal*, **35**, pp. 712–722.

Lowry, D. (2009). 'Age, the life course, and environmental justice', *Environmental Justice*, **2**, pp. 109–116.

Mainemelis, C. (2001). 'When the muse takes it all: a model for the experience of timelessness in organizations', *Academy of Management Review*, **26**, pp. 548–565.

Mather, M. and L. L. Carstensen (2003). 'Aging and attentional biases for emotional faces', *Psychological Science*, **14**, pp. 409–415.

Matta, E. and P. W. Beamish (2008). 'The accentuated CEO career horizon problem: evidence from international acquisitions', *Strategic Management Journal*, **29**, pp. 683–700.

McClelland, P. L., V. L. Barker III and W. Y. Oh (2012). 'CEO career horizon and tenure: future performance implications under different contingencies', *Journal of Business Research*, **65**, pp. 1387–1393.

McKendall, M., C. Sánchez and P. Sicilian (1999). 'Corporate governance and corporate illegality: the effects of board structure on environmental violations', *The International Journal of Organizational Analysis*, **7**, pp. 201–223.

Miller, J. S., R. M. Wiseman and L. R. Gomez-Mejia (2002). 'The fit between CEO compensation design and firm risk', *Academy of Management Journal*, **45**, pp. 745–756.

Nogee, A., S. Clemmer, B. Paulos and B. Haddad (1999). *Powerful Solutions: 7 Ways to Switch America to Renewable Energy*. Cambridge, MA: Union of Concerned Scientists.

NYSE (2010). *Report of the New York Stock Exchange Commission on Corporate Governance*, September 23. Available at: http://www.nyse.com/pdfs/CCGReport.pdf.

Ortiz-de-Mandojana, N. and J. A. Aragón-Correa (2015). 'Boards and sustainability: the contingent influence of director interlocks on corporate environmental performance', *Business Strategy and the Environment*, **24**, pp. 499–517.

Ortiz-de-Mandojana, N. and P. Bansal (2016). 'The long-term benefits of organizational resilience through sustainable business practices', *Strategic Management Journal*, **37**, pp. 1615–1651.

Porter, M. E. (1992). 'Capital disadvantage: America's failing capital investment system', *Harvard Business Review*, **70**, pp. 65–82.

Roberge, M. W., J. C. Flaherty, R. M. Almeida and A. C. Boyd (2017). 'Lengthening the investment time horizon'. White paper series, MFS.

Russo, M. V. and N. S. Harrison (2005). 'Organizational design and environmental performance clues from the electronics industry', *Academy of Management Journal*, **48**, pp. 582–593.

Serwinek, P. (1992). 'Demographic and related differences in ethical views among small businesses', *Journal of Business Ethics*, **11**, pp. 555–566.

Sharma, S. (2000). 'Managerial interpretations and organizational context as predictors of corporate choice of environmental strategy', *Academy of Management Journal*, **43**, pp. 681–697.

Slawinski, N. and P. Bansal (2012). 'A matter of time: temporal perspectives in organizational responses to climate change', *Organization Studies*, **33**, pp. 1537–1563.

Slawinski, N. and P. Bansal (2015). 'Short on time: intertemporal tensions in business sustainability', *Organization Science*, **26**, pp. 531–549.

Stamov Roßnagel, C. and G. Hertel (2010). 'Older workers' motivation: against the myth of general decline', *Management Decision*, **48**, pp. 894–906.

Stiglitz, J. E. (1989). 'Using tax policy to curb speculative short-term trading', *Journal of Financial Services Research*, **3**, pp. 101–115.

Taylor, R. N. (1975). 'Age and experience as determinants of managerial information processing and decision making performance', *Academy of Management Journal*, **18**, pp. 74–81.

The Economist (2017). 'At what cost? 100% renewable energy', *The Economist*, July 15, pp. 53–54.

Thomsen, S. and T. Pedersen (2000). 'Ownership structure and economic performance in the largest European companies', *Strategic Management Journal*, **21**, pp. 689–705.

Tietjen, O., M. Pahle and S. Fussb (2016). 'Investment risks in power generation: a comparison of fossil fuel and renewable energy dominated markets', *Energy Economics*, **58**, pp. 174–185.

Troy, C., K. Smith and M. Domino (2011). 'CEO demographics and accounting fraud: who is more likely to rationalize illegal acts?', *Strategic Organization*, **9**, pp. 259–282.

US EPA (2010). 'Human-related sources and sinks of carbon dioxide', http://www.epa.gov/climatechange/emissions/co2_human.html.

US Energy Information Administration (2010). *Status of Electricity Restructuring by State*. Available at: http://www.eia.gov/electricity/policies/restructring/restructure_elect.html.

US Securities and Exchange Commission (2013). *Form 10K*. Available at: http://www.sec.gov/answers/form10k.htm.

Wade-Benzoni, K. A. (1999). 'Thinking about the future', *American Behavioral Scientist*, **42**, 1393–1405.

Wade-Benzoni, K. A., H. Sondak and A. D. Galinsky (2010). 'Leaving a legacy: intergenerational allocations of benefits and burdens', *Business Ethics Quarterly*, **20**, pp. 7–37.

Waegelein, J. F. (1988). 'The association between the adoption of short-term bonus plans and corporate expenditures', *Journal of Accounting and Public Policy*, **7**, pp. 43–63.

Walls, J. L. and P. Berrone (2017). 'The power of one to make a difference: how informal and formal CEO power affect environmental sustainability', *Journal of Business Ethics*, **145**, 293–308.

Walters, B. A., M. Kroll and P. Wright (2008). 'CEO ownership and effective boards: impacts on firm outcomes', *Strategic Organization*, **6**, pp. 259–283.

Wang, T. and P. Bansal (2012). 'Social responsibility in new ventures: profiting from a long-term orientation', *Strategic Management Journal*, **33**, pp. 1135–1153.

Wiersema, M. F. and H. P. Bowen (1997). 'Empirical methods in strategy research: regression analysis and the use of cross-section versus pooled time-series, cross-section data'. In M. Ghertman, J. Obadia and J. L. Arregle (eds), *Statistical Models for Strategic Management*, pp. 201–219. Boston: Kluwer.

Wright, P., S. P. Ferris, A. Sarin and V. Awasthi (1996). 'Impact of corporate insider, blockholder, and institutional equity ownership on firm risk taking', *Academy of Management Journal*, **39**, pp. 441–463.

Zahra, S. A., D. O. Neubaum and M. Huse (2000). 'Entrepreneurship in medium-size companies: exploring the effects of ownership and governance systems', *Journal of Management*, **26**, pp. 947–976.

Zimbardo, P. G. and J. N. Boyd (1999). 'Putting time in perspective: a valid, reliable individual differences metric', *Journal of Personality and Social Psychology*, **77**, pp. 1271–1288.

Zimbardo, P. G. and J. Boyd (2008). *The Time Paradox: The New Psychology of Time That Will Change Your Life*. New York: Free Press.

Natalia Ortiz-de-Mandojana is Associate Professor of Management and Strategy at the University of Granada (Spain). She investigates the connections between corporate governance and environmental management and the role of time in shaping the financial aspects of business sustainability. She has published in JCR-indexed international journals, such as *Strategic Management Journal*, *Journal of Business Ethics*, *Business Strategy and the Environment*, *Business & Society*, among others. Natalia has been a visiting researcher at the Ivey School of Business (London, Ont., Canada) and the Cass Business School (London, UK).

Pratima (Tima) Bansal is the Canada Research Chair of Business Sustainability at the Ivey Business School, Western University (London, Ont., Canada). She investigates the dimensions of organizational time, space and scale to understand sustainability. She has published in the *Academy of Management Journal* and *Organization Science*, among other journals, and is currently a Deputy Editor of the *Academy of Management Journal* (2016–2019). She also founded and currently directs the Network for Business Sustainability (www.nbs.net), which aims to bridge sustainability research and practice.

J. Alberto Aragón-Correa is Professor of Strategy at the University of Granada (Spain). His research interests lie in the connections between businesses' environmental strategies and their sustainability. Alberto is the author of more than 40 refereed articles published in top international business and management journals, including *Academy of Management Review*, *Academy of Management Journal*, *California Management Review* and *Academy of Management Perspectives*, among others. He is currently Editor of the Cambridge University Press Book Series on Organizations and the Natural Environment.