

# CEO's temporal orientation and entrepreneurial orientation of firm: The contingent effects of environmental characteristics

Saikat Banerjee<sup>a,\*</sup>, Amit Karna<sup>b</sup>, Sunil Sharma<sup>b</sup>, Vishal K. Gupta<sup>c</sup>

<sup>a</sup> Management Development Institute, Gurgaon 122 007, India

<sup>b</sup> Indian Institute of Management Ahmedabad, Vastrapur, Ahmedabad 380015, India

<sup>c</sup> Culverhouse College of Business, The University of Alabama, 361 Stadium Dr, Tuscaloosa, AL 35487, USA

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## ABSTRACT

Extending upper echelon theory perspective, the paper extends the past research literatures on the effects of CEO characteristics in determining strategic choices of firms, and examines the effects of CEO's temporal orientation on entrepreneurial orientation of firms. Moreover, examining the contingent effects of environmental munificence, complexity, and dynamism in the U-shaped relationship between CEO's temporal orientation and entrepreneurial orientation of firm contributes to the understanding of the boundary conditions and determines the strength of the relationship between CEO's temporal orientation and EO of firm. We test our hypotheses using panel data analysis of Indian firms during 2007–2016.

## 1. Introduction

Entrepreneurial orientation (EO) (Lumpkin & Dess, 1996; Miller, 1983) is a strategic posture (Covin & Lumpkin, 2011) of firms crucial for the renewal of competitive advantage and sustainable firm performance (Lumpkin & Dess, 1996, 2001; Mahmood & Hanafi, 2013; Wiklund & Shepherd, 2003, 2005). In the organizational context, chief executive officers (CEOs) immensely influence strategic orientation (Hambrick & Mason, 1984) and specifically EO (Simsek, Heavey, & Veiga, 2010; Wales et al., 2013) of firms. Extending the research on time perspectives (Chen & Nadkarni, 2017; Shipp & Cole, 2015), CEO's temporal orientation (Lumpkin, Brigham, & Moss, 2010) may influence the EO of firms operating under several contextual factors. Even research paper examining the effects of long term orientation on entrepreneurial orientation (Lumpkin et al., 2010) ignores the context in which the firm operates. What is the effect of CEO's temporal orientation on entrepreneurial orientation of firm? What are the effects of different contextual factors in influencing this relationship? The paper explains the phenomena utilizing upper echelon theory and contingency theory perspectives.

Time is a hidden dimension of strategic planning (Das, 1987), and CEO's temporal orientation, future time perspectives of individuals, is an important construct in the field of strategic management (Das, 2004; Nadkarni & Chen, 2014). Both short-term and long-term temporal-oriented CEOs influence EO of firms.

Extending the contingency theory, we also examine the contingent effects of environmental complexity, environmental dynamism, and environmental munificence on the relationships between CEO's temporal orientation and EO of firm.

By combining these multiple concepts, this paper contributes the followings. First, the paper theoretically and empirically examines the relationship between CEO temporal orientation and EO of firm. Second, examining the roles of environmental factors in shaping the relationship between CEO's temporal orientation and EO of firm explains the boundary conditions and extends the existing literature related to antecedents of EO at the CEO-EO interface using upper echelon and contingency theory perspectives. Finally, the findings have great implications for practitioners, CEOs, board members, shareholders and policy regulators.

In the next section, we discuss theoretical backgrounds and past literature. Then, we develop hypotheses to describe relationships among CEO's temporal orientation, environmental factors, and entrepreneurial orientation of firms. Finally, we describe proposed methodology and implications for both researchers and practitioners.

\* Corresponding author.

E-mail addresses: [saikat.banerjee@mdi.ac.in](mailto:saikat.banerjee@mdi.ac.in) (S. Banerjee), [karna@iima.ac.in](mailto:karna@iima.ac.in) (A. Karna), [sunilsharma@iima.ac.in](mailto:sunilsharma@iima.ac.in) (S. Sharma), [vkgupta@cba.ua.edu](mailto:vkgupta@cba.ua.edu) (V.K. Gupta).

## 2. Literature review

### 2.1. Antecedents of entrepreneurial orientation of firm

The concept of EO was emerged from the concepts of entrepreneurial decision making (Mintzberg, 1973) and management style (Khandwalla, 1977). EO of firm is a strategic posture (Covin & Lumpkin, 2011) consisting of three dimensions such as innovativeness, risk-taking, and proactiveness (Covin & Slevin, 1989; Lumpkin & Dess, 1996; Miller, 1983; Wales, Gupta, & Mousa, 2013). Recent meta-analyses (Rauch, Wiklund, Lumpkin, & Frese, 2009; Rosenbusch, Rauch, & Bausch, 2013) also recognize the dominance of three dimensional view of EO in the past literatures.

Past research literatures on the antecedents of EO examined the effects of various institutional (Fayolle, Basso, & Bouchard, 2010; Kreiser, Marino, Dickson, & Weaver, 2010; Lee & Peterson, 2000; Roxas & Chadee, 2013), industrial (Caruana, Ewing, & Ramaseshan., 2002; José Ruiz-Ortega, Parra-Requena, Rodrigo-Alarcón, & García-Villaverde, 2013; Rosenbusch et al., 2013), organizational (De Clercq, Dimov, & Thongpapanl, 2013; Green, Covin, & Slevin, 2008; Williams & Lee, 2009; Zahra, Hayton, & Salvato, 2004), and individual factors on EO of firm.

At the individual level, managers' psychological characteristics such as need for achievement, risk-taking propensity, tolerance of ambiguity (Begley & Boyd, 1987), generalized self-efficacy, self-attributed achievement motive (Poon, Ainuddin, & Junit, 2006) influence EO of firm. In the context of rapidly changing environment, recent research literatures emphasize on examining various CEO characteristics to explain EO of firm utilizing upper echelon perspective (Grühn, Strese, Flatten, Jaeger, & Brettel, 2017; Richard, Wu, & Chadwick, 2009; Simsek et al., 2010).

### 2.2. CEO characteristics and entrepreneurial orientation of firm: upper echelon perspective

Chief executive officers (CEOs) determine strategic orientation (Hambrick & Mason, 1984) and specifically EO (Simsek et al., 2010; Wales et al., 2013) of firms.

### 2.3. CEO's temporal orientation

Temporal orientation of individuals is defined as the future time perspectives of individuals based on short term orientation and long term orientation with their preferences for short and long planning horizons respectively (Das, 1987). Time is a hidden dimension of strategic planning (Das, 2004). Individual's time perspectives can be considered as the totality of his or her past, present, and future (Lewin, 1942). CEO's psychological view of time (Das, 2004) and specially temporal orientation (Nadkarni & Chen, 2014) influence strategic choices. Although CEO's temporal orientation influences resource allocations, and strategic activities of firms (Das, 1987; Das & Teng, 2001; Mosakowski & Earley, 2000; Shi, Sun, & Prescott, 2012), research in this domain is still in nascent stage (Das, 1987; Nadkarni & Chen, 2014; Yadav, Prabhu, & Chandy, 2007). Long term orientation represents a particular temporal perspective, characterized by futurity, continuity, and perseverance, that influences a range of strategic and managerial decisions with long-term implications. We propose to extend the theoretical understanding of the effects of CEO's temporal orientation on EO of firm in the subsequent sections.

## 3. Hypothesis development

### 3.1. CEO's temporal orientation and entrepreneurial orientation of firm

In this section, we examine the effects of CEO's temporal orientation on EO. Though the effects of temporal orientation of key organizational

actors on organizational processes are recently recognized in research literature (Ancona et al., 2001), the effects of individual time orientation of key decision makers on entrepreneurial orientation of firm are not examined (Lumpkin et al., 2010). What are the effects of CEO's temporal orientation on EO? Do environmental characteristics influence the relationship between CEO's temporal orientation and EO? The aims of this section are to examine these research questions, understand the effects of CEO's temporal orientation on EO, and investigate the effects environmental characteristics on the relationship between CEO's temporal orientation and EO.

CEO's temporal orientation influences resource allocation in firms (Das, 1987; Das & Teng, 2001; Mosakowski & Earley, 2000; Shi et al., 2012) and subsequently entrepreneurial orientation of firms. Extending the concept of short-term and long-term temporal orientation, we propose that short-term orientation emphasizes immediate results and quick returns, whereas long-term orientation focuses on long time-horizon with future outcomes and sustained performance over time (Laverty, 1996). CEOs with different temporal orientations prioritize different strategic objectives, thereby shaping the firm's EO.

EO is a firm-level strategic orientation reflecting the firm's strategic posture towards innovativeness, risk-taking, and proactiveness (Lumpkin & Dess, 1996). Innovativeness can be achieved through novel solutions and creativity. Risk-taking involves strategic decisions with uncertain outcomes. Proactiveness refers to quickly predict the future, and fast decision making (Miller, 1983).

### 3.2. Short-term orientation and EO

Short-term oriented CEOs focus on quick decision making and fast execution of creative projects to deliver results immediately by seizing current market opportunities. They promote risk-taking by pursuing high-risk projects with short payoffs. Furthermore, their proactive approach may result in early market trend adoption for a competitive advantage (Nadkarni & Chen, 2014). However, excessive involvement in short-term orientation results in the reduction of long-term investments due to the execution of risky short term projects. Hence, short-term focus can increase EO, but, excessive focus in short term orientation may lead to long term EO (Laverty, 1996).

### 3.3. Long-term orientation and EO

Long-term oriented CEOs concentrate on long term growth and future success through the investment in R&D and development of innovative organizational culture. They aim for future growth and long term stability.

Conversely, CEOs with a long-term orientation prioritize sustainable growth and future success. They are likely to invest in R&D and foster an organizational culture that values continuous innovation. Long-term orientation encourages calculated risk-taking, with a focus on ventures that promise future growth and stability (Simsek et al., 2010). However, a strong long-term orientation may slow down the immediate response to the current market condition. Hence, long-term orientation helps to achieve EO in long term future of the organization (Zahra, 1996).

### 3.4. Mid-range temporal orientation and EO

CEOs with mid-range temporal orientation struggle to balance short-term and long-term strategic goals leading to strategic ambiguity. According to the concept of organizational ambiguity, mid-range temporal orientation results in a tension between the exploitation of existing opportunities (short term focus), and exploration of new opportunities (long term focus) (Gibson & Birkinshaw, 2004; O'Reilly & Tushman, 2013). In the ambidextrous organizations, CEOs with mid-range temporal orientation can neither fully commit short term efficiency, nor focus on long term innovation (Raisch & Birkinshaw, 2008; Simsek, Heavey, Veiga, & Souder, 2009).

The lack of risky and quick decisions to seize short term opportunities result in the reduction of firm agility (Lavie, Stettner, & Tushman, 2010; March, 1991). Additionally, the inability to understand the long term strategies such as innovation leads to lack of sustainable competitive advantage (Levinthal & March, 1993; March, 1991). The failure to manage either short term temporal exploitation or long term temporal exploration is similar to the balancing exploration and exploitation in ambidextrous organizations (O'Reilly & Tushman, 2013; Tushman & O'Reilly, 1996).

The relationship shows patterns of U shaped relationships often seen in strategy research. According to Haans, Pieters, and He (2016), U-shaped relationships occur when two opposing forces such as short-term and long-term temporal orientation generate non-linear outcomes. CEOs with mid-range temporal orientation are unable to involve in either exploitation or exploration of opportunities leading to reduced entrepreneurial orientation. The extremes such as either a strong short-term or long-term temporal orientation lead to higher entrepreneurial orientation due to the clarity and alignment in strategic decision-making (Auh & Menguc, 2005; Palich, Cardinal, & Miller, 2000).

Based on the above theoretical reasoning, we propose a U-shaped relationship between CEO's temporal orientation and firm's EO. Firms led by CEOs with either a strong short-term or long-term orientation will exhibit higher levels of EO, and firms with the mid-range temporal orientation will demonstrate lower EO. The positive effects of short-term and long-term orientation on EO are generated from quick risky decision making, and innovative strategies respectively. Mid-range orientation leads to strategic ambiguity and lower EO.

Based on the above reasoning, we propose the following hypothesis.

**Hypothesis 1.** CEO's temporal orientation and firm's entrepreneurial orientation has a U-shaped relationship.

#### 4. Environmental moderators and contingency theory: examining the contingent effect of environment

Environment is a critical contingency in organizational phenomena (Lumpkin & Dess, 2001) and determines the source of information and stock of resources (Aldrich & Mindlin, 1978; Lumpkin & Dess, 2001). The roles of leaders are also contingent upon the requirements of evolving organizational contexts (Eggleston & Bhagat, 1993). Environmental characteristics determine the effectiveness of top management style (Becherer & Maurer, 1998; Khandwalla, 1977).

The U-shaped relationship between CEO's temporal orientation and EO of firm is contingent on the characteristics of the environment in which the firm operates. Organizational task environment (Dess & Beard, 1984) can be explained by understanding environmental uncertainty having three dimensions such as environmental munificence, complexity, and dynamism. The effects of these dimensions vary across different levels of uncertainty. In the subsequent sections, we examine the effects of environmental munificence, complexity, and dynamism on the relationship between CEO's temporal orientation and EO of firm.

##### 4.1. The effect of environmental complexity

Environmental complexity is defined as the task environment consisting of high amount of diverse information, knowledge, resources, and capabilities (Mintzberg, 1973). Environmental complexity can make strategic decisions difficult, and influences predictability, analyzability, uncertainty, and diversity of external events (Stewart, May, & Kalia, 2008).

In low environmental complexity, the external environment is relatively stable and predictable, with fewer variables and less need for extensive information processing. In this environment, CEOs can utilize their temporal orientation in a simpler way. Short-term temporal oriented CEOs can easily take quick and risky decisions. However, the same simplicity also limits the breadth of opportunities available for

immediate exploitation. Thus, the inherent limitations of a short-term orientation become more pronounced, leading to a more negative effect on EO (Miller & Friesen, 1983). Similarly, the strategic vision of long-term temporal oriented CEOs can be effectively implemented under low environment complexity. The stability and predictability in the low environmental complexity help to execute long term innovative projects and enhance the positive effects of long-term temporal orientation on EO (Dess & Beard, 1984).

In contrast, in high environmental complexity, the external environment is characterized by numerous, diverse, and interrelated factors that require extensive information processing. This complexity challenges the strategic actions of CEOs with different temporal orientations.

**For Short-Term Oriented CEOs:** In highly complex environments, short-term oriented CEOs face significant challenges. The need to process diverse information and manage varied demands can overwhelm the decision-making process, making it difficult to pursue immediate and clear-cut opportunities. The complexity dilutes the focus on short-term gains, as the CEO must constantly adapt to a multitude of factors, reducing the effectiveness of a short-term orientation. Thus, the negative effect of short-term orientation on EO is mitigated by the environmental complexity, as the need to navigate complexity requires a broader and more adaptive approach (Miller & Friesen, 1983).

**For Long-Term Oriented CEOs:** In contrast, high environmental complexity presents both challenges and opportunities for long-term oriented CEOs. The need to anticipate and plan for future trends aligns well with the strategic foresight inherent in long-term orientation. However, the unpredictable and multifaceted nature of a complex environment can hinder the execution of long-term strategies, as constant adaptation and re-evaluation are necessary. While long-term oriented CEOs can still leverage their future-oriented approach to manage complexity, the positive effects on EO may be less pronounced compared to low complexity environments. The constant need to adapt and re-strategize in a complex environment can dilute the focus on sustained innovation and proactive positioning (Dess & Beard, 1984).

Based on the above theoretical reasoning, we propose that environmental complexity moderates the U-shaped relationship between CEO's temporal orientation and EO. In low environmental complexity, the negative effects of short-term orientation on EO are more pronounced, and the positive effects of long-term orientation on EO are more substantial. In high environmental complexity, the negative effects of short-term orientation are mitigated, and the positive effects of long-term orientation are less pronounced, reflecting the contingent nature of strategic effectiveness in varying environmental contexts.

Based on the above reasoning, we propose the following hypothesis.

**Hypothesis 2.** Environmental complexity will moderate the U-shaped relationship between CEO's temporal orientation and EO such that the negative effect of CEO's temporal orientation on EO among firms with short temporal oriented CEOs will be more negative, and the positive effects of CEO's temporal orientation on EO among firms with long temporal oriented CEOs will be more positive in low environmental complexity than high environmental complexity.

##### 4.2. The effect of environmental dynamism

Dynamic environment consists of low feedback learning (Atuahene-Gima & Li, 2004; Nadkarni & Chen, 2014; Song & Montoya-Weiss, 2001), transient opportunities (Atuahene-Gima & Li, 2004; Nadkarni & Chen, 2014; Song & Montoya-Weiss, 2001), and depreciation of technological and market information (Eisenhardt & Bourgeois III, 1988; Nadkarni & Chen, 2014; Simsek et al., 2010). Rapid and discontinuous changes in demand, competitors, technology, and regulations are observed in dynamic environment.

In low environmental dynamism, the stable and predictable external environment initiates fewer rapid changes, and less need for frequent strategic adjustments. This stability allows CEOs to focus on their

preferred temporal orientation without the constant pressure to adapt to changing conditions. Short-term temporal oriented CEOs might find fewer immediate opportunities to exploit due to the slower pace of change. The stability and predictability of the environment limit the urgency for quick, innovative responses and high-risk ventures. As a result, the negative effects of short-term orientation on EO are more pronounced in low dynamism settings, as the environment does not provide sufficient stimuli for rapid innovation and risk-taking (Dess & Beard, 1984). This can lead to a more significant decrease in EO for firms led by short-term oriented CEOs. Long term temporal oriented CEOs can easily implement their strategic vision in the stable environment, involving continuous innovation (Miller & Friesen, 1983).

In contrast, in high environmental dynamism, the external environment is characterized by rapid and unpredictable changes, resulting in agile and flexible strategic responses. Short term temporal oriented CEOs in high environmental dynamism, can leverage their ability to make quick decisions and rapidly adapt to changing conditions. The need for rapid responses aligns well with the strengths of short-term orientation, allowing firms to capitalize on emerging opportunities despite the inherent risks (Lumpkin & Dess, 2001). Long term temporal oriented CEOs decisions on long term innovation and long term strategies hamper due to unpredictable, and rapid changes in the environment. Resulting in the positive effects of long-term orientation on EO less pronounced in high dynamism environments (Miller & Friesen, 1983). The continuous need to adapt and re-strategize can reduce the benefits typically associated with a long-term orientation.

Based on the above theoretical reasoning, we propose that environmental dynamism moderates the U-shaped relationship between CEO's temporal orientation and EO. In low environmental dynamism, the negative effects of short-term orientation on EO are more evident, and the positive effects of long-term orientation on EO are more substantial. In high environmental dynamism, the negative effects of short-term orientation are mitigated, and the positive effects of long-term orientation are less pronounced, reflecting the contingent nature of strategic effectiveness in varying environmental contexts.

Based on the above reasoning, we propose the following hypothesis.

**Hypothesis 3.** Environmental dynamism will moderate the U-shaped relationship between CEO's temporal orientation and EO such that the negative effect of CEO's temporal orientation on EO among firms with short temporal oriented CEOs will be more negative, and the positive effects of CEO's temporal orientation on EO among firms with long temporal oriented CEOs will be more positive in low environmental dynamism than high environmental dynamism.

#### 4.3. The effect of environmental munificence

Environmental munificence is defined as the environment having opportunities, and resources (Dess & Beard, 1984). Environment having opportunities and resources influences entrepreneurial alertness and commitment (Tang, 2008). It also provides abundant resources enhancing firm survival and encouraging stakeholders' expectation for long term future growth (Park & Mezias, 2005). Environmental munificence helps firms to accumulate additional resources (Karaevli, 2007; provides wider options to the strategic decisions of CEO (Karaevli, 2007); and influence the effects of CEO's temporal orientation on EO of firm.

In high environmental munificence, short term temporal oriented CEOs can quickly leverage abundant resources to innovate and take risks. The availability of resources helps to achieve their goals quickly through rapid decision-making and proactive market actions. However, this focus on short-term gains can also lead to over-exploitation and resource depletion, potentially resulting in a negative impact on EO over time (Castrogiovanni, 1991). Thus, the negative effects of short-term orientation on EO are more pronounced in high munificence environments due to potential resource misallocation and short-lived

innovations. Long term temporal oriented CEOs can more effectively implement their strategic vision by focusing on R&D and long term strategic goals. This setting enhances the positive effects of long-term orientation on EO, as long-term projects can be supported without the constraints of resource scarcity (Dess & Beard, 1984). The availability of resources provides helps to execute long-term strategies, influencing the positive impact on EO.

In contrast, in low environmental munificence, the external environment is characterized by resource scarcity, limiting the strategic options and innovation potential of firms. Short term temporal oriented CEOs are unable to pursue high risk, quick decisions due to lack of resources leading to decrease in EO (Lumpkin & Dess, 2001). Long term temporal oriented CEOs also face challenges to access resources for long term innovation leading to lesser EO.

Based on the above theoretical reasoning, we propose that environmental munificence moderates the U-shaped relationship between CEO's temporal orientation and EO. In high environmental munificence, the negative effects of short-term orientation on EO are more prominent, and the positive effects of long-term orientation on EO are more prominent. In low environmental munificence, the negative effects of short-term orientation are mitigated, and the positive effects of long-term orientation are less pronounced, reflecting the contingent nature of strategic effectiveness in varying environmental contexts.

Based on the above reasoning, we propose the following hypothesis.

**Hypothesis 4.** Environmental munificence will moderate the U-shaped relationship between CEO's temporal orientation and EO such that the negative effect of CEO's temporal orientation on EO among firms with short temporal oriented CEOs will be more negative, and the positive effects of CEO's temporal orientation on EO among firms with long temporal oriented CEOs will be more positive in high environmental munificence than low environmental munificence.

## 5. Methodology

### 5.1. Sample

In order to conduct an empirical investigation of our research model, we gathered secondary data on Indian enterprises from various sources. Since our research depends on secondary data, which is only disclosed by well-established companies, we gathered information from NSE 500 companies that are listed on the National Stock Exchange of India. The majority of listed companies in India are represented by the corporations listed in the NSE 500 index. This methodology bears similarities to other research (Engelen, Gupta, Strenger, & Brettel, 2015; Engelen, Neumann, & Schwens, 2015; Grünh et al., 2017) that looked at S&P 500 companies in the United States.

The National Industrial Classification, which is published by the Central Statistical Organization, Ministry of Statistics and Programme Implementation, Government of India, includes two-digit NIC codes for every industry. Initially, we chose the companies included in the NSE 500 index. We extracted Letters to Shareholders from company annual reports by downloading them from the ACE Equity database and other sources. In India, it is not always possible to find a Letter to Shareholder across firms and years; it is an optional publication.

Following a thorough search, we gathered 1898 Letters to Shareholder of 321 companies between 2007 and 2016. We use the Prowess database to gather firm-level data. In the Indian context, the Prowess database has been widely validated and employed in previous research publications (Chacar & Vissa, 2005; Manikandan & Ramachandran, 2015). Data about CEOs is also gathered from the Indian Board database. We eventually have unbalanced panel data of 1103 firm-year observations for 240 firms from 2007 to 2016 after merging databases and eliminating missing values.

After reduction of some data due to the usage of lag independent variables and requirements of at least two observations of the same firm



in generalized estimated equation (GEE) technique, our final sample size is 615 firm-year observations for 133 firms from 2007 to 2016. Our sample size is comparable to the similar past studies having sample sizes of 142 firm-year observations of 61 firms (Engelen, Gupta, et al., 2015; Engelen, Neumann, & Schwens, 2015), and 706 firm-year observations of 67 firms (Grühn et al., 2017).

## 5.2. Measures

**Entrepreneurial Orientation:** As per Wales et al. (2013), the prevalent methodology for assessing entrepreneurial orientation, we regard EO as a unidimensional construct that encompasses risk-taking, innovativeness, and proactiveness. Computer-aided text analysis is used to measure the dimensions using the Short, Broberg, Coglisier, and Brigham (2010) dictionary of terms. The lexicon includes a list of terms for traits like initiative, inventiveness, and taking risks. We make use of CAT Scanner, a computer-aided text analysis tool created by Dr. Jeremy C. Short, a professor and the Rath Chair in Strategic Management at the Price College of Business at the University of Oklahoma, and Aaron F. McKenny, an assistant professor of management at the University of Central Florida. Three dimensions' relative frequencies were combined, and the composite frequency was used as the EO measure.

In line with other research (Engelen, Gupta, et al., 2015; Engelen, Neumann, & Schwens, 2015), we take many steps to guarantee the measure's validity. First, the list of words was created by Short et al. (2010) using external validity, nomological validity, dimensionality, predictive validity, and deductive and inductive content analysis. The associations documented in the literature are comparable to the relationships between other variables and EO that were derived from the word list. Secondly, we also examined a random subsample of shareholder letters to see whether or not the terms listed in Short et al. (2010)'s vocabulary are utilized favorably. We discovered that the majority of the terms we use to gauge EO are positively used in the letter to shareholders and have helped to raise EO. Thirdly, in order to determine if EO assessed by the CATA approach and manual rating produced comparable findings, we chose a subsample of 50 LTS. In line with Engelen, Gupta, et al. (2015) and Engelen, Neumann, and Schwens (2015), we measure EO using the 10-item scale through the use of historiometric data collection approach. Three business students received each anonymous LTS, and we asked them to score the EO questionnaire on a 5-point Likert scale. We calculated IIC(1) and ICC(2), both of which are below minimum threshold values (0.20 for ICC(1), and 0.60 for ICC (2)) indicating strong within letter reliability. The Cronbach's alpha for EO was above 0.80. The EO scores derived from CATA are significantly correlated to EO scores generated through historiometry. These findings suggest that EO measures obtained from CATA are valid.

**CEO's Temporal Orientation** is measured as the asset durability i.e. the annual investment in property, plant, and equipment (PP&E) divided by depreciation expense (Martin, Wiseman, & Gomez-Mejia, 2016). The temporal orientation of CEOs indicating their investment horizon or forward-looking approach in decision-making, is not directly quantifiable. However, asset durability can serve as a proxy for this concept. According to Martin et al. (2016), this measure reflects the extent of a firm's investment in durable assets, including property, plant, and equipment (PP&E). Asset durability is determined by the ratio of the firm's annual investment in PP&E to its depreciation expense. This ratio helps to conduct a dynamic analysis through panel data, enabling the observation of changes in a CEO's temporal orientation over time in relation to variations in firm-specific resources and entrepreneurial orientation. Given that depreciation expense is derived from gross assets divided by their useful life, asset durability effectively represents the firm's commitment to long-term investments, thereby indicating the CEO's orientation towards long-term assets that experience depreciation over multiple years.

**Environmental Complexity** is measured using the sales market shares of all firms in each industry. Herfindahl index is the sum the

squares of the sales market shares of all firms in each industry. Complexity is then one minus this Herfindahl index so that low values correspond with low levels of complexity (Dess & Beard, 1984; Shi et al., 2012).

**Environmental Dynamism** is calculated based on the industry values of sales over preceding five years. After regressing the industry values of sales over 5 years immediately preceding the focal year of analysis, environmental Dynamism is measured as the standard error of the slope of the regression coefficient of time divided by the mean value of total industry sales over the five preceding years. This is an annual, industry-level variable (Dess & Beard, 1984; Simerly & Li, 2000).

**Environmental Munificence** is simple growth rate for each industry year as the percentage change in industry revenues from the previous year (Dess & Beard, 1984; Richard, Murthi, & Ismail, 2007).

**Control Variables:** We collected variables at the CEO level, firm level, industry level to control for the effects of other factors.

*CEO age* is defined as age of CEO (Cao, Simsek, & Jansen, 2015).

*CEO Gender* is considered as a dummy variable "1" for man, or "0" otherwise.

*CEO education* is defined as a dummy variable indicating whether or not CEO has an MBA degree (Cao et al., 2015). It is measured using a dummy variable having "1" when CEO has an MBA degree, or "0" otherwise.

*CEO Duality:* CEO Duality is defined as CEO is also the chairperson of the board. We measure it using a dummy variable having "1" when both chairperson of the board and CEO are the same person, or "0" otherwise (Iyengar & Zampelli, 2009).

*CEO's Experience:* It is measured as the number of years for which the CEO has been employed in his or her current position (Boling et al., 2016).

*Frequency of board meetings:* It is measured as the number of meetings held by the board of directors annually (Vafeas, 1999).

*Board Independence:* It is measured as the percentage of outside directors on the board (Deb & Wiklund, 2017).

*Board size* is measured as the total number of board members.

*Firm Size* is measured as the log of annual sales (Miller & Breton-Miller, 2011).

*Firm Age* is measured as the number of years since the incorporation of the firm (Miller & Breton-Miller, 2011).

*Firm's Past Performance* is measured as the firms' sales growth in the preceding year (Grühn et al., 2017).

*Business group affiliation* is measured as a dummy variable consisting of 1 for "es", and 0 otherwise.

We also control for *industries* and *years*.

## 5.3. Model specification

In accordance with previous research on the junction of EO and CEO (Engelen, Neumann, & Schwens, 2015; Grühn et al., 2017), we estimate our regression models using the generalized estimated equation (GEE) approach. GEE provides many benefits, including the ability to take into account non-independent observations and the lack of a necessity for regularly distributed data (Ballinger, 2004). GEE is appropriate for our investigation since the data we observe may not be independent or regularly distributed. Additionally, using GEE can aid in ensuring consistency and comparability with the body of existing literature (Engelen, Gupta, et al., 2015; Engelen, Neumann, & Schwens, 2015).

In accordance with the recommendations made by Ballinger (2004) for fitting GEE models and the methodology employed by Engelen, Gupta, et al. (2015) and Engelen, Neumann, and Schwens (2015), we selected the Gaussian link family and an identity link function. Autoregressive correlation structure means that observations that are closer in time have higher correlations. The test for autocorrelation in panel data ( $p < 0.05$ ) supported this decision, which makes sense theoretically (Wooldridge, 2010).

## 6. Findings

Descriptive statistics and correlations for the variables are provided in the Table 1. Before proceeding to test our hypotheses, we standardized all independent and control variables to minimize problems of multicollinearity and to facilitate interpretability. We also test for multicollinearity. As the variance inflation factor is well below 10 (Hair & Anderson, 1998), multicollinearity is not an issue in the data. All independent variables are lagged by one year. Table 2 represents regression results of all tests.

Model 1 represents the effects of only control variables on EO of firm. Model 2 represents the main effects of moderators along with control variables on EO of firm. Model 3a shows a significant positive relationship between CEO's temporal orientation and EO of firm ( $\beta = 0.0003$ ,  $p = 0.057$ ) and provides support for the general notion that CEO's temporal orientation enhances EO of firm (Fig. 1).

Model 3b tests hypothesis 1 that states that CEO's temporal orientation is related to EO of firm in a U-shaped manner. The findings shown in Table 2 and Fig. 2, confirm the predicted U-shaped relationship between CEO's temporal orientation and EO ( $\beta$  of squared term = 0.0001,  $p = 0.096$ ). Thus, Hypothesis 1 is supported.

Model 4a tests hypothesis 2 that proposes environmental complexity will moderate the U-shaped relationship between CEO's temporal orientation and EO such that the negative effect of CEO's temporal orientation on EO among firms with short temporal oriented CEOs will be more negative, and the positive effects of CEO's temporal orientation on EO among firms with long temporal oriented CEOs will be more positive in low environmental complexity than high environmental complexity. The significant effects ( $\beta$  of squared term = -0.0003,  $p = 0.01$ ) of the interaction term between environmental complexity and squared term of CEO's temporal orientation supports hypothesis 2.

Model 4b tests the moderating effects of environmental dynamism on U-shaped relationship between CEO's temporal orientation and EO. However, the non-significant effect ( $\beta$  of squared term = 0.0001,  $p = 0.351$ ) rejects hypothesis 3.

In Model 4c, we test hypothesis 4 that proposes environmental munificence will moderate the U-shaped relationship between CEO's temporal orientation and EO such that the negative effect of CEO's temporal orientation on EO among firms with short temporal oriented CEOs will be more negative, and the positive effects of CEO's temporal orientation on EO among firms with long temporal oriented CEOs will be more positive in high environmental munificence than low environmental munificence. The significant effects ( $\beta$  of squared term = 0.001,  $p = 0.099$ ) of the interaction term between environmental munificence and squared term of CEO's temporal orientation supports hypothesis 4.

As our GEE models is not being maximum likelihood, chi-square is the only measure for goodness of fit (Miller & Breton-Miller, 2011). According to Grün et al. (2017), while the chi-squared values of some of our models are comparatively low (<150 for the full sample;  $p = 0.000$ ), prior studies on strategic orientations have shown that R-squared/chi-squared values tend to be lower when using objective measures. In their studies on the effects of CEO characteristics of EO, Grün et al. (2017) found chi-squared value <176, and followed the approach suggested by Boling et al. (2016) that modest explanatory power is of less concern when the research focuses on investigating theoretically plausible associations (in our case between CEO Temporal Orientation and EO of firm) rather than on finding "a set of factors that maximally explain the observed variance" (p. 15). Similarly, we also follow similar approach and consider our chi-squared value in the model.

Although, we regress the dependent variable "Entrepreneurial Orientation (EO)" on the independent variable CEO Temporal Orientation (CTO) and its square (CTO\_Sq) ( $EO = \beta_0 + \beta_1 * CTO + \beta_2 * CTO\_Sq$ ), the significant p value of the square term is necessary but not sufficient to establish U shape (Haans et al., 2016). According to Haans et al. (2016), the U-shaped relationship can be tested in detail using a three-

step process. Firstly, a significant and positive  $\beta_2$  (0.0001329,  $p = 0.096$ ) indicates a U-shaped relationship. Secondly, as the slopes ( $\beta_1 + 2 * \beta_2 * CTO$ ) at lower and upper values of CEO temporal Orientation are negative (-0.00031518) and positive (0.003204958) respectively, and statistically significant, we can consider the relationship between CEO temporal orientation and entrepreneurial orientation as U-shaped relationship. Finally, as the location of turning point ( $-\beta_1/2 * \beta_2$  with 95 % confidence interval) where the relationship changes direction (from decreasing to increasing in a U-shape), is between lower and higher values of CEO temporal Orientation and within the data range, we may consider that the U-shape relationship is within the data range of CEO temporal orientation. Additionally, we also follow the suggestions of Haans et al. (2016), and graphically plotted the relationship. The U-shape relationship and the position of turning point within the data range are also graphically checked. Based on the additional analysis, the U-shaped relationship between CEO temporal orientation and entrepreneurial orientation can be proposed.

Graphs in Fig. 2 describe the moderation effects of environmental complexity, and environmental munificence on the U-shape relationship between CEO temporal orientation and entrepreneurial orientation of firms. The general model used to test for moderation in a U-shaped relationship is as follows:

$$EO = \beta_0 + \beta_1 * CTO + \beta_2 * CTO\_Sq + \beta_3 * CTO * M + \beta_4 * CTO\_Sq * M + \beta_5 * M$$

where, EO is entrepreneurial orientation, CTO is CEO Temporal Orientation

CTO\_Sq is square of CEO temporal orientation, M is moderator.

There are two distinct ways in which a moderator can affect a U-shaped relationship such as shifting the turning point (left or right), and flattening or steepening the Curve.

If the moderators (environmental complexity, and environmental munificence) affect the turning point (shifts it left or right), it will be reflected by the significance of the interaction term (CTO \* M) (i.e.,  $\beta_3$ ). In our models,  $\beta_3$  is not significant for both the moderators i.e. environmental complexity ( $p = 0.183$ ), and environmental munificence ( $p = 0.299$ ). Then, moderators do not significantly shift the turning point of the U-shaped relationship between CEO temporal orientation and entrepreneurial orientation.

Significant effects of (CTO\_Sq \* M) denotes that both environmental complexity ( $p = 0.01$ ), and environmental munificence ( $p = 0.09$ ) affect the curvature of U shaped relationship. Environmental complexity flattens ( $\beta_4 = -0.000326$ ), and environmental munificence steepens ( $\beta_4 = 0.0013837$ ) the U-shaped relationship between CEO temporal orientation and entrepreneurial orientation.

### 6.1. Robustness tests

We performed a robustness test to strengthen the validity of our findings. According to Wooldridge (2002) and Angrist and Pischke (2009), the first stage of IV regression only needs to explain the variation in CEO temporal orientation. We generally include CEO temporal orientation as the endogenous variable and the IV, EPS. We do not include transformations of the IV (such as its square) unless there is a strong theoretical justification for doing so. However, quadratic term, square of CEO temporal orientation is included in the second stage when we check for non-linear relationship. Wooldridge (2002) explains that we hypothesize a quadratic relationship between CEO temporal orientation and entrepreneurial orientation, we handle it in the second stage by including both CEO temporal orientation, and its square term in the outcome equation. There is no need to include the square of the instrumental variable in the first stage because its purpose is simply to predict the endogenous CEO temporal orientation, not to capture the non-linearity in entrepreneurial orientation.

**Table 1**  
Descriptive statistics and correlations.

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Entrepreneurial Orientation	0.0078138	0.0052244	1												
2 CEO's Temporal Orientation	2.584328	3.22327	-0.0093 (0.7573)	1											
3 CEO Experience	10.49139	9.395218	0.072 (0.0167)	-0.0191 (0.5271)	1										
4 CEO Age	53.12965	10.74994	-0.0712 (0.018)	-0.0176 (0.56)	0.287 (0)	1									
5 Board Size	12.44515	3.560016	-0.0568 (0.0592)	-0.0178 (0.5546)	-0.15 (0)	0.1468 (0)	1								
6 Board Independence	0.4607765	0.1148964	0.118 (0.0001)	-0.0265 (0.3788)	0.2802 (0)	-0.0101 (0.7383)	-0.1311 (0)	1							
7 Frequency of Board Meetings	4.897996	1.142761	0.0107 (0.7225)	0.0121 (0.6879)	0.0213 (0.4814)	-0.0041 (0.8919)	0.0932 (0.002)	0.0294 (0.3312)	1						
8 Firm Size	6.061638	1.801686	0.0184 (0.5423)	0.0023 (0.9395)	-0.1073 (0.0004)	0.1361 (0)	0.3707 (0)	-0.088 (0.0034)	0.0574 (0.0574)	1					
9 Firm Age	37.29012	21.65547	-0.0677 (0.0245)	-0.0382 (0.2045)	0.0038 (0.8989)	0.1815 (0)	0.1172 (0.0001)	0.0585 (0.052)	-0.002 (0.947)	0.3281 (0)	1				
10 Firm's Past Performance	1.876905	47.10359	0.0045 (0.8806)	0.2713 (0)	-0.0308 (0.3075)	0.0197 (0.513)	0.0223 (0.4592)	0.0274 (0.3636)	-0.0232 (0.4425)	-0.0303 (0.3146)	-0.0483 (0.1085)	1			
11 Environmental Complexity	0.7006187	0.2184433	0.1002 (0.0009)	0.0648 (0.0322)	0.0681 (0.0244)	-0.005 (0.8684)	-0.0103 (0.7329)	0.0818 (0.0068)	0.0109 (0.719)	-0.1216 (0.0001)	0.0773 (0.0106)	-0.0023 (0.9404)	1		
12 Environmental Dynamism	0.0784111	0.0988003	-0.0848 (0.005)	-0.0366 (0.2263)	-0.0322 (0.2875)	0.108 (0.0003)	0.0758 (0.0122)	-0.005 (0.8695)	-0.0263 (0.3852)	0.0871 (0.004)	-0.0325 (0.2828)	-0.0207 (0.4947)	-0.4384 (0)	1	
13 Environmental Munificence	0.0079931	0.1194015	0.0013 (0.966)	-0.0168 (0.5797)	-0.0061 (0.8397)	-0.007 (0.8175)	-0.0131 (0.6652)	0.0252 (0.4065)	-0.0278 (0.3609)	-0.0193 (0.5261)	-0.0192 (0.5267)	-0.0025 (0.9344)	-0.1312 (0)	0.2635 (0)	1

p values in parentheses.

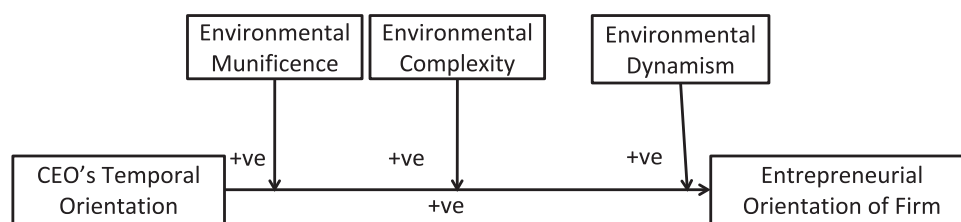
CEO: Chief Executive Officer.

**Table 2**  
Regression results.

DV:entrepreneurial orientation	Model 1	Model 2	Model 3a	Model 3b	Model 4a	Model 4b	Model 4c
<u>Controls</u>							
CEO Duality	-0.0010773 (0.086)	-0.0012108 (0.056)	-0.0011906 (0.06)	-0.0012793 (0.045)	-0.0011801 (0.064)	-0.0012531 (0.049)	-0.0012967 (0.042)
CEO's Experience	0.0003059 (0.328)	0.0003664 (0.247)	0.0003448 (0.275)	0.0003695 (0.243)	0.0003133 (0.323)	0.000351 (0.267)	0.0003834 (0.227)
CEO Age	-0.0000475 (0.03)	-0.0000476 (0.03)	-0.000047 (0.031)	-0.0000489 (0.025)	-0.0000478 (0.028)	-0.0000475 (0.03)	-0.0000495 (0.024)
CEO Gender	-0.0000248 (0.987)	-0.0001897 (0.901)	-0.0000324 (0.983)	0.00000231 (0.999)	-0.0001353 (0.93)	0.0000263 (0.986)	-0.0000771 (0.96)
CEO Education	0.0004836 (0.372)	0.0004013 (0.464)	0.0003716 (0.496)	0.0003253 (0.553)	0.0004642 (0.399)	0.0003097 (0.571)	0.0003493 (0.525)
Board Size	0.0002553 (0.35)	0.0002573 (0.35)	0.00026 (0.343)	0.0003019 (0.273)	0.0002997 (0.276)	0.000288 (0.296)	0.0003092 (0.262)
Board Independence	0.00016 (0.474)	0.0001577 (0.482)	0.000174 (0.437)	0.0002058 (0.359)	0.0002247 (0.315)	0.0002062 (0.357)	0.0002179 (0.33)
Firm Size	-0.0000299 (0.937)	-0.0000796 (0.838)	-0.0000854 (0.826)	-0.0000491 (0.9)	0.00000786 (0.984)	-0.0000559 (0.886)	-0.0000365 (0.926)
Firm Age	-0.0004656 (0.105)	-0.0004487 (0.121)	-0.000444 (0.124)	-0.0004384 (0.131)	-0.0004269 (0.141)	-0.0004445 (0.124)	-0.0004396 (0.13)
Firm's Past Performance	0.0054501 (0.147)	0.0066446 (0.079)	0.0055404 (0.146)	0.0044937 (0.243)	0.002141 (0.584)	0.0041332 (0.287)	0.0038321 (0.321)
Business Group Affiliation	0.000621 (0.322)	0.0006362 (0.313)	0.0006679 (0.288)	0.0006515 (0.302)	0.0006442 (0.308)	0.0007002 (0.267)	0.0005941 (0.348)
Frequency of Board Meetings	-0.000033 (0.854)	-0.0000762 (0.677)	-0.00008 (0.661)	-0.0000753 (0.679)	-0.0000518 (0.774)	-0.0000976 (0.593)	-0.000072 (0.691)
Industry Controls	Included	Included	Included	Included	Included	Included	Included
Year Controls	Included	Included	Included	Included	Included	Included	Included
<u>Main Effects</u>							
Environmental Complexity		0.0002988 (0.443)	0.0002536 (0.514)	0.00027 (0.486)	0.0005387 (0.179)	0.0003237 (0.407)	0.0002083 (0.593)
Environmental Dynamism		0.0002189 (0.531)	0.0002323 (0.505)	0.0002125 (0.541)	0.0001659 (0.635)	0.0000485 (0.897)	0.0003605 (0.322)
Environmental Munificence		-0.0002479 (0.042)	-0.0002404 (0.049)	-0.0002362 (0.051)	-0.0002188 (0.069)	-0.0002696 (0.029)	-0.0007193 (0.06)
CEO's Temporal Orientation			0.0003392 (0.057)	-0.0001027 (0.747)	-0.0004518 (0.201)	-0.0001561 (0.63)	-0.000132 (0.678)
(CEO's Temporal Orientation) <sup>2</sup>				0.0001329 (0.096)	0.0003407 (0.002)	0.0001546 (0.074)	0.0002613 (0.018)
<u>Two-way interactions</u>							
Environmental Complexity × (CEO's Temporal Orientation)					0.0005618 (0.183)		
Environmental Complexity × (CEO's Temporal Orientation) <sup>2</sup>					-0.0003264 (0.01)		
Environmental Dynamism × (CEO's Temporal Orientation)						-0.000636 (0.179)	
Environmental Dynamism × (CEO's Temporal Orientation) <sup>2</sup>						0.0001756 (0.351)	
Environmental Munificence × (CEO's Temporal Orientation)							0.0003257 (0.299)
Environmental Munificence × (CEO's Temporal Orientation) <sup>2</sup>							0.0013837 (0.099)
Chi <sup>2</sup>	125.54 (0.000)	132.67 (0.000)	136.97 (0.000)	138.88 (0.000)	146.6 (0.000)	141.47 (0.000)	141.46 (0.000)

p values in parentheses.

CEO: Chief Executive Officer.



**Fig. 1.** The model.



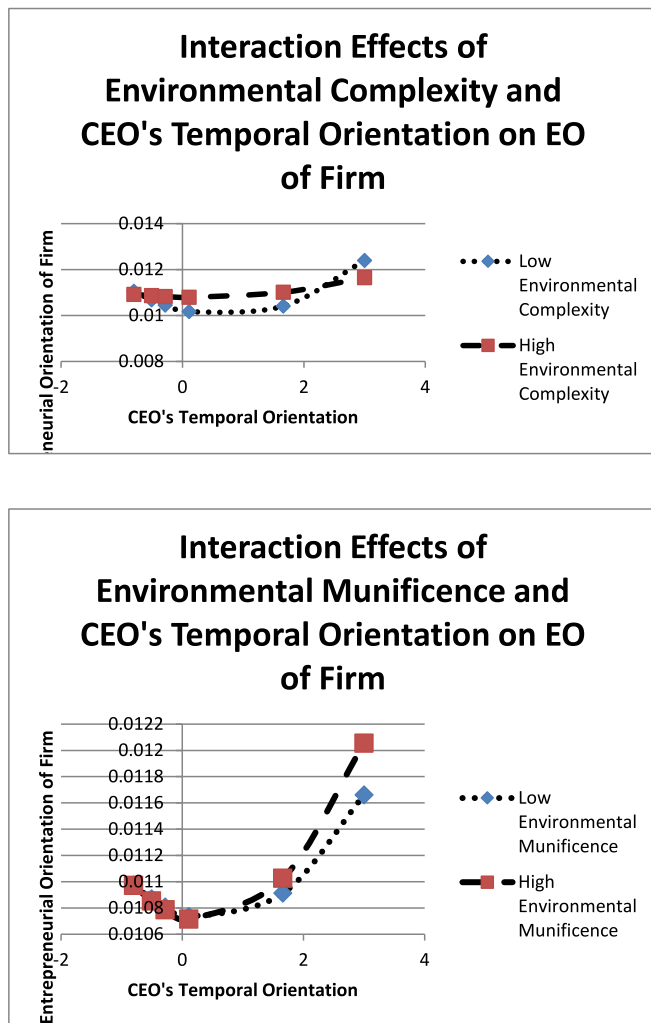


Fig. 2. Interaction effects.

We performed a robustness test to strengthen the validity of our findings. Although the longitudinal nature of our studies mitigates the possibility of endogeneity, it is still conceivable that a CEO's temporal orientation might follow a firm's entrepreneurial orientation. We employed the Durbin–Wu–Hausman test, which tests the endogeneity of regressors by using instrumental factors (Baum, Schaffer, & Stillman, 2003; Semadeni, Withers, & Trevis Certo, 2014), to evaluate this danger. We employed earnings per share as the instrumental variable, as per Boling, Pieper, and Covin (2016).

Firstly, we regress the independent variable CEO temporal orientation (which is suspected of being endogenous) on the instrumental variable (IV), earnings per share (EPS). After running the first stage regression, we obtain the residuals. The residuals represent the portion of CEO temporal orientation that cannot be explained by the instrumental variable earnings per share. This will be used to test for endogeneity. Then, we include the residuals in our GEE model as an additional explanatory variable. This allows us to test whether the residuals are significant, which would indicate endogeneity. As the residual is not significant ( $p = 0.16$ ), we can conclude that endogeneity is not a problem in the model. Additionally, as the Durbin–Wu–Hausman test shows that endogeneity is not significant ( $p = 0.86$ ), we can continue using our GEE model without needing instrumental variables.

## 7. Conclusions

### 7.1. Theoretical contribution

Contributing to the extant literatures on upper echelon theory and contingency theory, we explain the effects of CEO's temporal orientation on EO of firms under various environmental conditions.

Firstly, this study explains the non-linear U-shaped relationship between CEO temporal orientation and EO of firms. Previous research predominantly focuses on linear effects of CEO characteristics on firm outcomes, often overlooking the potential for more complex relationships. By proposing and empirically testing a U-shaped relationship, this study explains that excessive short-term, and long-term temporal orientation will lead to high amount of firm's EO, whereas mid-level temporal orientation will lead to ambiguity and low amount of EO.

Secondly, we extend environmental contingency theory by examining the moderation effects of environmental characteristics such as complexity, dynamism, and munificence in the U-shaped relationship between CEO temporal orientation and EO.

Examining the relationship between CEO's temporal orientation, entrepreneurial orientation of firms, and environmental characteristics contributes to the research literatures on upper echelon theory, strategic orientation, and contingency theory.

### 7.2. Managerial implications

Though the importance of strategic decisions considering temporal orientation perspective is well recognized among CEOs, in practice, CEOs and board members struggle to identify the avenues through which the temporal perspective of individuals would influence strategic decisions and entrepreneurial orientation of firms. By theoretically and empirically examining the effects of temporal orientation on entrepreneurial orientation of firm, the paper helps practitioners to understand the U-shaped relationship between CEO's temporal orientation and EO of firm. CEOs with either short or long term temporal orientation can emphasize on considering entrepreneurial decisions to utilize their personal characteristics and contribute to firm performance.

The findings from this study provide several important managerial implications for CEOs and senior executives aiming to optimize their firms' entrepreneurial orientation (EO) within varying environmental contexts. Understanding the nuanced relationship between CEO temporal orientation and EO, and how this relationship is moderated by environmental complexity, dynamism, and munificence, can guide more effective strategic decision-making.

Firstly, managers must recognize that both excessively short-term and long-term temporal orientations are helpful to develop EO of firms.

Secondly, as the relationship between CEO temporal orientation and EO of firms is dependent on environmental characteristics, managers need to track the changes in the industry trend to take informed strategic decisions.

Thirdly, to effectively navigate these varied environmental conditions, managers should invest in robust environmental scanning mechanisms. By continuously monitoring the external environment, CEOs can make more informed decisions about adjusting their temporal orientation and strategic initiatives. This proactive approach helps firms stay ahead of market trends and capitalize on emerging opportunities.

Fourthly, leadership development programs should emphasize the roles of temporal orientation of leaders. Understanding the time perspective in the context of industry level environmental characteristics is the key to success.

Finally, boards of directors play a crucial role in shaping and overseeing CEO strategic orientation. Board members should be aware of the CEO's temporal orientation and its impact on EO, providing guidance and oversight to ensure that the CEO's approach aligns with the firm's long-term strategic goals and environmental realities.

### 7.3. Limitations and future research directions

While this study provides valuable insights into the relationship between CEO temporal orientation and firm entrepreneurial orientation (EO), moderated by various environmental factors, there are some limitations that can be addressed in future research.

Firstly, one of the primary limitations is the measurement of CEO temporal orientation. This study relies on proxies to measure the temporal orientation of CEOs. Future studies could benefit from more precise and objective measures, potentially through longitudinal analysis of decision-making patterns or psychometric evaluations.

Secondly, the generalizability of the findings may be constrained by the specific sample and context of the study. The sample is from Indian context. Future research should aim to replicate and extend these findings across diverse regions, and cultural contexts to enhance the generalizability of the results.

Finally, the study focuses on three specific environmental factors: complexity, dynamism, and munificence. However, other environmental variables, such as technological change, regulatory shifts, and competitive intensity, may also play significant roles in moderating the relationship between CEO temporal orientation and EO. Future research should explore these additional environmental dimensions to provide a more comprehensive understanding.

Several future research directions can be explored further to understand the phenomena.

Firstly, developing and validating more robust measures of CEO temporal orientation is essential for the development of research stream on temporal aspects of decision making. Future studies could use a combination of behavioral data, psychometric assessments, and archival data to capture a more accurate and comprehensive picture of CEOs' temporal orientations.

Secondly, future research should investigate a wider range of environmental factors that might moderate the relationship between CEO temporal orientation and EO. Examining variables such as technological turbulence, regulatory environments, and cultural influences may result in more theoretical contributions.

Thirdly, expanding the scope of research to include diverse cultural and geographic contexts will enhance the generalizability of the findings. Comparative studies across different countries and regions could explain country specific characteristics influencing the relationship between CEO temporal orientation and EO of firms.

Fourthly, future research could explore the role of board governance and organizational structure in shaping the impact of CEO temporal orientation on EO. Investigating how board oversight, governance mechanisms, and structural characteristics interact with CEO temporal orientation could provide a more holistic understanding of strategic decision-making processes.

Fifthly, Although following the seminal paper of Miller (1983), we have considered the unidimensional conceptualization of entrepreneurial orientation consisting of innovativeness, risk taking, and proactiveness, the future research papers examining various phenomena such as innovation, research & development, new product development, managerial risks, strategic risks, first/ late mover advantages, speed of strategic decisions etc. can utilize these dimensions separately to find meaningful insights.

Finally, identifying potential mediating mechanisms that explain how CEO temporal orientation influences EO could further advance theoretical understanding by opening the black box. For instance, examining the role of strategic planning processes, innovation capabilities, and resource allocation strategies as mediators could offer deeper insights into the underlying dynamics.

In conclusion, while this study makes significant contributions to the literature on CEO temporal orientation and firm EO, addressing these limitations and pursuing the new future research directions will help to build a more comprehensive and robust understanding of these complex relationships.

### Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author(s) used ChatGPT of OpenAI in order to check the grammatical corrections. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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### CRediT authorship contribution statement

**Saikat Banerjee:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation. **Amit Karna:** Writing – review & editing, Supervision, Conceptualization. **Sunil Sharma:** Writing – review & editing, Supervision. **Vishal K. Gupta:** Writing – review & editing, Supervision, Conceptualization.

### Declaration of competing interest

None.

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### Data availability

Data will be made available on request.

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