I Did it My Way: CEO Core Self-Evaluations and the Environmental Contingencies on Firm Risk Taking Strategies

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ABSTRACT

This study presents an environmentally contingent view of CEO core self-evaluations (CSE) and the effects on strategic risk taking. Drawing on upper echelons theory and approach-avoidance theory, we propose that high CSE CEOs are responsive to rather than disregard environmental cues and pursue strategic risks that enable the firm to capitalize on competitive opportunities while refraining from risks not suited to the external environment. Focusing on two forms of strategic risk—resource allocation risk taking and strategic nonconformity—we develop hypotheses examining the contingencies across levels of environmental concentration, dynamism, and munificence. We test our hypotheses on a panel of 106 CEOs from publicly traded US companies over 1998-2004 using historiometric analyses. Supporting our hypotheses, findings indicate that the effects of CEO CSE on resource allocation risk taking and strategic nonconformity are contingent on industry concentration and environmental dynamism. Findings advance the understanding of CEO's positive self-regard.

Keywords: Executive Personality; Core Self-Evaluations; Environmental Factors; Risk Taking; Upper Echelons Theory

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Chief Executive Officers (CEOs) are inundated with strategic information as they determine how to leverage their firm's resources and capitalize on emerging opportunities (Eklund & Mannor, 2021). According to upper echelons theory, executives are bounded rational decisions makers (Simon, 1957) whose interpretation of strategic stimuli and decisions are shaped by their personal psychological characteristics (Hambrick, 2007). Because CEO decisions play a central role in shaping the firm's strategic direction, "the stakes associated with their humanness—both positive and negative—are enormous" (Hambrick, Finkelstein, & Mooney, 2005: 503). Given these high stakes consequences, a focus of upper echelon research has been to identify the psychological characteristics that explain differences in executives' interpretation of strategic stimuli and the pursuit of biased and risky decisions (e.g., Finkelstein, Hambrick, & Cannella, 2009). Positive self-regard is a constellation of psychological characteristics that holds great promise for advancing the understanding of how a CEO's humanness shapes a firm's adaptive and maladaptive strategic behavior (Tang, Qian, Chen, & Shen, 2015; Wang, Holmes, Oh, & Zhu, 2016). Broadly reflecting self-assuredness in one's abilities and decisions, positive self-regard is a meta-construct encompassing core self-evaluations, narcissism, overconfidence, and hubris (Finkelstein et al., 2009). The implications of executive positive self-regard for understanding strategic risk taking are substantial and warrant careful empirical consideration (Finkelstein et al., 2009).

Among these characteristics, core self-evaluations (CSE) offer a comprehensive, robust, and well-validated personality construct for examining the effects of executives' positive self-regard (Finkelstein et al., 2009). CSE is defined as the "fundamental assessments that people

make about their worthiness, competence, and capabilities" (Judge, Bono, Erez, & Locke, 2005: 257) that address how individuals evaluate themselves and their relationship to their environment across situations (e.g., Judge, Erez, Bono, & Thoresen, 2003). In theorizing the strategic implications of executive CSE, Hiller and Hambrick (2005) cautioned that their tremendous self-assuredness biases high CSE CEOs toward maladaptive strategic actions that involve extreme risk and ultimately undermine firm success. This perspective has dominated the study of CSE in upper echelons research. High CSE CEOs are portrayed as extremely confident decision-makers who underestimate environmental challenges, overestimate their ability to overcome obstacles, and pursue bold, high risk strategies in search of high returns regardless of the demands of the competitive environment (e.g., Chng, Rodgers, Shih, & Song, 2012; Stock, Groß, & Xin, 2018).

However, this portrayal of high CSE CEOs as bold, risk-seeking executives is at odds with the approach-avoidance framework of CSE which argues that CSE captures fundamental evaluations of one's capacity to adapt to and capitalize on environmental stimuli (Johnson, Rosen, & Levy, 2008). Differences in underlying approach and avoidance temperaments are theorized to explain why high CSE individuals possess superior problem-coping strategies that enable them to capitalize on opportunities across contexts, and to achieve work and career success across settings (Chang, Ferris, Johnson, Rosen, & Tan, 2012).

The purpose of this paper is to challenge the notion that high CSE CEOs have a penchant for pursing bold, high-risk strategic decisions across settings. Instead, we theorize that high CSE CEOs are motivated to pursue strategic behaviors that leverage the opportunities of their firm's competitive environment, undertaking risk when the environment supports such behavior and refraining from risk taking not suited to the competitive environment. A wide range of decisions have been associated with managerial risk taking (Hoskisson, Chirico, Zyung, & Gambeta,

2017). In this study, we focus on two forms identified in Hoskisson et al.'s (2017) framework—resource allocation risks and strategic nonconformity—to provide a broad examination of risk taking. We further propose that the relationships between CEO CSE and strategic risk taking are contingent upon the firm's competitive environment rather than direct. We examine these environmental contingencies across three factors that capture a firm's competitive task environment, namely industry concentration, environmental dynamism, and environmental munificence (Dess & Beard, 1984; Walters, Kroll, & Wright, 2010).

This study advances the understanding of CEO's CSE traits and positive self-regard in several ways. Rather than being bold decision-makers who undertake excessive risks because they underestimate environmental demands and overestimate their capacity to manage risks, our theory and findings indicate that high CSE CEOs are responsive and adaptive to environmental cues. Guided by high approach and low avoidance temperaments, we demonstrate that high CSE CEOs pursue or refrain from strategic risk taking to capitalize on opportunities afforded by the firm's competitive environment. Moreover, Hoskisson and colleagues' (2017) framework highlights the complexities among the factors that enable or inhibit forms of strategic risk taking. Our study demonstrates the importance of taking a multi-dimensional perspective on risk taking and the firm's competitive environment. Failing to account for the environmental contingencies would provide an incomplete and perhaps even erroneous view of the relationship between CSE and risk taking. Therefore, our study offers a nuanced and environmentally contingent view of the strategic implications of CEO CSE that shifts the understanding of high CSE executives as bold risk seekers to calculated risk takers.

Our study also underscores the importance of distinguishing an executive's positive self-regard emanating from high levels of CSE versus a positive self-regard stemming from an

inflated sense of self (e.g., overconfidence: Chen, Crossland, & Luo, 2015; hubris: Tang, Mack, & Chen, 2018; narcissism: Chatterjee & Hambrick, 2011). Whereas each of these psychological characteristics is reflected in high levels of self-assuredness and outward displays of confidence, narcissism, hubris, and overconfidence are associated with a lack of responsiveness to external capability cues and feedback (e.g., Finkelstein et al., 2009). CSE is unique among these traits, because high CSE individuals are responsive to feedback and attentive rather than dismissive of environmental factors (Chang et al., 2012; Judge & Kammeyer-Meuller, 2011). Therefore, our study sheds new light on the interface between CEO personality and firm environments, demonstrating that CSE offers a promising lens for examining the implications of CEOs' positive self-regard for adaptive as opposed to maladaptive strategic behavior.

CSE IN THE STRATEGIC CONTEXT

CSE encompasses the commonality among four traits reflecting one's self-concept including self-esteem, generalized self-efficacy, emotional stability, and an internal locus of control (Judge, Locke, Durham, & Kluger, 1998). These component traits are broad in scope, evaluation-focused, and fundamental in nature (e.g., Johnson et al., 2008; Judge et al., 2005). People with high levels of CSE are optimistic, hold a positive view of their capabilities, and manage their lives and interpersonal interactions in a confident, well-adjusted manner (e.g., Chang et al., 2012). They view themselves as in control of their successes and failures, and tend not to be encumbered by self-doubts and worry (Judge et al., 2005). Alternatively, individuals with lower levels of CSE tend to be less optimistic and more pessimistic about their capabilities and the opportunities inherent in their environments, make external as opposed to internal attributions, and are prone to experiencing worry and anxiety (Judge et al., 2005).

High CSE individuals possess the confidence and optimism needed to obtain executive-

level positions and make complex strategic decisions with high-stakes consequences. However, researchers have also cautioned that high CSE may not always be beneficial for CEOs who deal with broad-scope strategic decisions (Judge, Piccolo, & Kosalka, 2009). To date, the prevailing view among upper echelons researchers is that the positive self-regard of high CSE CEOs biases their decision making such that they overestimate their own capabilities, underestimate potential challenges, and experience little apprehension pursuing large-stakes, high-risk strategies because they believe they can effectively manage the risks (e.g., Haleblian, Markoczy, & McNamara, 2007; Heavey, Fox, Simsek, & Hambrick, 2015; Hiller & Hambrick, 2005).

CEO positive self-regard encompasses four traits including narcissism, overconfidence, hubris, and CSE. Each of these characteristics is reflected in the degree to which CEOs hold a favorable view of themselves and their capacity to influence their environments (Wang et al., 2016). One of the most highly studied aspects of CEO positive self-regard is narcissism, which is "a relatively stable individual difference consisting of grandiosity, self-love, and inflated self-view" (Campbell, Hoffman, Campbell, & Marchisio, 2011: 269). Narcissistic CEOs are self-interested and grandiose self-promotors who seek attention (Campbell, Goodie, & Foster, 2004) and pursue bold strategic actions to garner recognition and personal rewards (Chatterjee & Hambrick, 2011; Gerstner, König, Enders, & Hambrick, 2013). Overconfidence reflects a miscalibration effect (Chen et al., 2015) involving an overestimation of "one's own abilities, performance, level of control, or chance of success" (Moore & Healy, 2008: 502). CEO hubris also encompasses an exaggerated sense of self-confidence and pride (Hiller & Hambrick, 2005; Li & Tang, 2010) and is often viewed as synonymous with CEO overconfidence (Finkelstein et al., 2009). CEO hubris and overconfidence have been associated with acquisition premiums, risky product introduction, and a general resistance to corrective feedback (e.g., Chen et al.,

2015; Li & Tang, 2010; Malmendier & Tate, 2008).

CSE is a unique form of positive self-regard. Narcissistic, hubristic, and overconfident CEOs hold unrealistic perceptions of their personal capabilities, exaggerate their probability of success, and demonstrate an unresponsiveness to external capability cues and performance feedback (e.g., Buyl, Boone, & Wade, 2019; Schumacher, Keck, & Tang, 2020; Tang et al., 2018). In contrast, high CSE CEOs are self-assured, resilient, responsive rather than dismissive of environmental factors, and driven to achieve challenging goals (e.g., Bono & Colbert, 2005; Chng et al., 2012; Resick, Whitman, Weingarden, & Hiller, 2009). Perhaps not surprisingly, CSE correlates positively with conscientiousness (Chang et al., 2012; Judge et al., 2003). Both traits are similar in that they encompass a proactive achievement orientation (Judge et al., 2003; Roberts, Chernyshenko, Stark, & Goldberg, 2005). However, the characteristics are also distinct in that highly conscientious individuals are cautious, dutiful, and self-controlled (Costa, McCrae, & Dye, 1991; Roberts et al., 2005), which are not encompassed within the CSE construct domain that also embodies emotional stability and an internal locus of control.

Approach-Avoidance Framework

Approach-avoidance theory provides a parsimonious theoretical framework for explaining the behavioral and performance implications of CSE (e.g., Chang et al., 2012; Ferris et al., 2011). High CSE individuals exhibit qualities associated with high approach and low avoidance motivation in regulating their behavior vis-a-vis environmental contingencies, while lower CSE individuals exhibit the opposite pattern of high avoidance and low approach motivation in regulating their behavior (e.g., Ferris et al., 2011).

Approach and avoidance orientations are conceptualized in the form of temperament, which is a basic building block of personality that encompasses differences in how people: a)

frame their environments and in turn attend to environmental stimuli; and b) *perceive control over their environments* and in turn how they respond to stimuli and persevere in pursuit of goals (Forgas, 2003). These distinctions are important as they provide insights into the processes whereby CEO positive self-regard is thought to influence firm strategic actions. These processes include CEOs' attentiveness to positive cues, their perceived attractiveness of alternative strategic actions, and their sense of confidence and control over their success in achieving their goals (e.g., Finkelstein et al., 2009).

Approach and avoidance temperaments are independent systems that arise through the activation of distinct networks of neurobiological mechanisms when evaluating and responding to environmental contexts (Elliot & Thrash, 2010). In turn, they manifest in observable situation-specific actions through their influence on personality (Elliott & Thrash, 2002). Approach temperaments are triggered by the facilitative behavioral activation system (BAS) which evokes positive and opportunistic framing of situations and provides individuals a strong sense of control in improving situations (Elliot, 1999; Elliot & Trash, 2010). Through opportunistic framing and the use of rational and vigilant decision-making styles, high CSE individuals attend to environmental stimuli more comprehensively and interpret environmental stimuli more accurately than lower CSE individuals (Di Fabio & Palazzeschi, 2012). Further, because of their perceived control over the situation, high CSE individuals believe that challenges are surmountable and are motivated to persevere and succeed in the face of challenges (e.g., Chang et al., 2012; Judge, Erez et al., 1998). In contrast, the avoidance temperaments of lower CSE individuals are triggered by the constraining behavioral inhibition system (BIS) which evokes a negative and threat-based framing of environmental stimuli. Avoidance-oriented individuals tend to be anxious, myopic in the focus of their attention, and prone to misinterpret environmental

demands (Elliot & Trash, 2002; 2010). Illustrating this point, CSE related negatively to dysfunctional and biased decision-making styles (e.g., procrastination, lack of readiness, issue avoidance, and indecisiveness) (Di Fabio & Palazzeschi, 2012). Individuals with lower levels of CSE also perceive little control over circumstances, tend to view environmental challenges as unsurmountable, and give up easily when faced with even moderately tough situations (Chang et al., 2012; Judge, Erez, et al., 1998).

The approach-avoidance framework of CSE is relevant to understanding the environmental contingencies on the strategic implications of CEO CSE because the two components of this framework—(1) environmental framing through an opportunistic or negative lens, and (2) perceived controllability of situations—are key determinants of how executives diagnose and respond to environmental issues (Dutton & Duncan, 1987; Dutton & Jackson, 1987). Strategic issue diagnosis research contends that positive opportunistic framing of strategic issues and perceptions of controllability over the situation enhance vigilance, reduce biases, and promote strategic actions that align with environmental demands (Chattopadhyay, Glick, & Huber, 2001). Conversely, negative threat-based framing and a perceived lack of control generate cognitive myopia resulting in rigidity rather than responsiveness, and the pursuit of strategies that are disconnected from environmental demands (McKinley, Latham, & Braun, 2014).

Strategic Risk Taking and Environmental Contingencies

Risk Taking

Managerial risk taking, which involves strategic choices that have ambiguous outcomes, is critical to the survival and success of organizations (Hoskisson et al., 2017; Palmer & Wiseman, 1999). On the one hand, risky strategic decisions create opportunities for large returns and competitive gains; on the other hand, risky strategic decisions heighten a firm's vulnerability

to forces in its external competitive environment (Miller & Bromiley, 1990). One commonality among the wide range of decisions that have been associated with managerial risk taking is the allocation of strategically important resources (Palmer & Wiseman, 1999). Building on the work of Miller and Bromiley (1990), researchers have examined CEOs' strategic risk taking through the integration of research and development (R&D) expenditures, capital expenditures, and long-term debt (e.g., Devers, McNamara, Wiseman, & Arrfelt, 2008; Kish-Gephart & Campbell, 2015). We follow this approach to examine CEO's resource allocation risk taking.

Another important form of strategic risk taking is strategic nonconformity, which is the degree to which firms adopt strategies in their key operations that are novel and differentiated from the strategic behavior of competitors (Deephouse, 1999; Finkelstein & Hambrick, 1990). By departing from industry tendencies, firms undertake bold strategic actions to differentiate themselves and gain a competitive advantage that is difficult for others to anticipate, copy, or retaliate against (Miller & Chen, 1996; Ndofor, Sirmon, & He, 2011). However, non-conforming strategies involve sizeable risk in that they are costly, prone to failure and may garner skepticism from stakeholders (e.g., suppliers, customers, investors) accustomed to established practices. Hiller and Hambrick (2005) theorized that high CSE CEOs pursue strategic differentiation from their competitors. To date, however, this relationship has not been tested empirically.

CEOs face the challenge of initiating strategies that balance strategic risks with the potential for high returns (Benischke, Martin, & Glaser, 2019; Connelly, Li, Shi, & Lee, 2020). Applying the approach-avoidance framework to the strategic context, high CSE CEOs are vigilant to competitive cues, frame environmental stimuli opportunistically, and perceive controllability over their circumstances. By constructively responding to these cues (Bono & Colbert, 2005) and relying on information-driven decision strategies (Di Fabio & Palazzeschi,

2012), high CSE CEOs are likely to pursue strategic risks that capitalize on opportunities afforded by their firm's competitive environment to secure to prospective high returns (DesJardine & Shi, 2021; Kish-Gephart, & Campbell, 2015). As CSE levels decline, an avoidance-focused lens clouds the interpretation of strategic stimuli. A preoccupation with negative cues (Chang et al., 2012) depletes self-regulatory resources and impairs problem-solving and decision-making (Elliot & Thrash, 2010; Johnson et al., 2008). Therefore, CEOs with lower levels of CSE are less likely to be attentive to cues signaling competitive opportunities and to frame their environments as challenging and uncontrollable; in turn, they pursue strategic risks that are misaligned with environmental demands. Next, we examine the environmental contingencies on the effects of CEO CSE on strategic risk taking.

Industry Concentration

Industry concentration reflects the level of competition and heterogeneity in the competitive environment (Dess & Beard, 1984). In high industry concentration, firms know who competitors are and the nature of competitive interactions is well understood (Xue, Ray, & Sambamurthy, 2012). As industry concentration increases, competition decreases because the number of rival firms is relatively low and barriers to market entry discourage new competition (Walter et al., 2010). In contrast, low industry concentration is characterized by high complexity and heterogeneity. Because fewer barriers to entry exist, firms must be vigilant to the actions and evolving competitive interactions among new entrants (Anderson & Tushman, 2001). With low industry concentration, competition increases and interconnectivity among firms intensifies creating complex market forces (Grimm, Lee, & Smith, 2006; Palmer & Wiseman, 1999).

In highly concentrated industries with fewer competitors and higher relative margins, executives face few significant challenges and experience little competitive pressure (Engelen,

Neumann, & Schwens, 2015). High CSE CEOs, guided by high approach and low avoidance temperaments, rely on competitive cues to determine the appropriate level of risk with strategic resources and tend to interpret highly concentrated environments as less competitive and complex. Taking on additional risk such as a large amount of R&D expenditure in such environments is unnecessary because even imperfect products can provide significant margins for the firm. Thus, high CSE CEOs are less motivated to pursue risks associated with taking on additional long-term debt or investing in capital projects. In contrast, because CEOs with lower levels of CSE are guided by high avoidance and low approach temperaments, they may narrow their attention to the market barriers or homogeneity among actors which lessens inhibitions regarding risk taking with strategic resources. In low concentration industries, intensifying R&D initiatives and capital improvements are likely to generate the innovation needed to compete successfully. These activities can provide clear a competitive advantage for the firm, motivating high CSE CEOs to take risks with firm resources. Conversely, CEOs with lower levels of CSE are likely to interpret the complexity of low concentration environments as a threat triggering risk averse actions in such environments.

> ***Hypothesis 1:*** Industry concentration has a moderating effect on the relationship between CEO CSE and firm resource allocation risk taking such that the relationship is negative in higher concentration environments and positive in lower concentration environments.

In high concentration environments, firms also need to distinguish themselves from other market leaders to protect market share. Strategic nonconformity helps to build a competitive advantage in highly concentrated industries. Because there are fewer main competitors and margins tend to be high, CEOs are less likely to be penalized for being wrong about the future (Engelen et al., 2015; Gupta, MacMillan, & Surie, 2004). The approach temperament of high CSE CEOs is likely to motivate them to pursue strategic differentiation to create a distinct

competitive advantage and be confident in their capacity to manage the risks associated with deviating from the predictable strategies and tendencies of competitors. In less concentrated environments with heterogeneous competitors, many firms compete across multiple segments of the market (Palmer & Wiseman, 1999). As many market opportunities exist, strategic differentiation is less likely to be necessary to generate high returns. We expect that high CSE CEOs are less likely to discern the potential for high returns and thus less motivated to pursue strategies that deviate from the already varied strategies of competitors. Alternatively, the avoidance temperament of CEOs with lower levels of CSE is likely to impair their interpretation of the cause and effect implications of strategic differentiation (Elliot & Thrash, 2010). Because of this misinterpretation and perceived lack of control over environmental factors they are unlikely to proactively pursue nonconforming strategies to create a competitive advantage.

> ***Hypothesis 2:*** Industry concentration has a moderating effect on the relationship between CEO CSE and firm strategic nonconformity such that the relationship is positive in higher concentration environments and negative in lower concentration environments.

Environmental Dynamism

Dynamic environments are characterized by high levels of uncertainty and instability (Keats & Hitt, 1988). As dynamism intensifies, market trends, competitive practices, technological innovations, and regulatory environments change rapidly and unpredictably (Dess & Beard, 1984; Walters et al., 2010). CEOs confront ambiguous information making it difficult to extract reliable insights regarding future states or to determine cause and effect relationships (Engelen et al., 2015; Nadkarni & Chen, 2014). In less dynamic and more stable environments, change is gradual rather than abrupt (Bergh & Lawless, 1998). Market expectations and competitive rules are well established, offering greater certainty regarding competitive conditions and future states (Bergh & Lawless, 1998; Haleblian & Finkelstein, 1993). Strategic

information is clear and consistent, enabling executives to discern cause-effect relationships with relative certainty (Bergh & Lawless, 1998; Walters et al., 2010).

The volatile and unpredictable nature of dynamic environments increases risk for organizations (Bergh & Lawless, 1998). As dynamism intensifies, the reliability of information and certainty over market conditions becomes increasingly questionable. CEOs are able to buffer their firms from income stream uncertainty or market fluctuations by minimizing risks in the use of strategic resources (Palmer & Wiseman, 1999). Alternatively, the reliability of information, predictability of market practices, and consistency of consumer demands enhance the reliability of income streams and creates conditions suitable for taking risks, such as increasing expenditures. Through their motivation to succeed and strong problem-solving capacities (Chang et al., 2012), high CSE CEOs recognize the importance of using firm resources judiciously, pursuing low-risk strategies to protect the firm's competitive positioning in more dynamic environments and higher-risk strategies to maximize returns in less dynamic environments. Alternatively, the avoidance temperament of CEOs with lower levels of CSE impairs their interpretation of competitive opportunities (Elliot & Thrash, 2002). The abundance of potential threats in both high and low dynamism environments are likely salient, anxiety inducing, and impairing the interpretation of the risk-reward implications of risky resource allocation decisions.

> ***Hypothesis 3:*** Environmental dynamism has a moderating effect on the relationship between CEO CSE and firm resource allocation risk taking such that the relationship is negative in more dynamic environments and positive in less dynamic environments.

The shifting demands in dynamic environments provide opportunities for CEOs to generate and exploit new means-ends frameworks (Bradley, Shepherd, & Wiklund, 2011; Nadkarni & Chen, 2014). Because of their vigilance to opportunities and well-honed self-regulatory capabilities (Chang et al., 2012), we expect that the approach temperament of high

CSE CEOs motive them to pursue strategic differentiation to exploit evolving conditions, forge a distinct competitive advantage, and achieve high returns. In less dynamic environments, competitive practices provide clear guiding markers for strategic decision-making and associated rewards (Nadkarni & Narayanan, 2007; Walters et al., 2010). Here, we expect that high CSE CEOs are vigilant to the means-goals structure underlying existing competitive norms and conform to tried and true strategies to garner the legitimacy needed to secure a superior competitive position (Deephouse & Suchman, 2008). Alternatively, we expect that CEOs with lower levels of CSE are ill-equipped to navigate a new course through the ambiguities and rapid pace of innovation in dynamic environments or to develop an in-depth understanding of the means-goal strategies underlying industry norms in less dynamic environments resulting in a misalignment between strategic nonconformity and environmental opportunities.

> ***Hypothesis 4:*** Environmental dynamism has a moderating effect on the relationship between CEO CSE and firm strategic nonconformity such that the relationship is positive in more dynamic environments and negative in less dynamic environments.

Environmental Munificence

Environmental munificence refers to the extent to which an environment supports sustained growth (Dess & Beard, 1984; Walters et al., 2010). A munificent environment is characterized by an abundance of emerging opportunities and growing markets (Dess & Beard, 1984). Flexibility and innovation in pursuit of future opportunities is encouraged because the downside risks are minimal (Bradley et al., 2011). Yet, munificent environments also attracts new entrants which induces variation and decreases the reliability of evolving strategic information (Palmer & Wiseman, 1999). Conversely, low munificence presents an increasingly hostile competitive environment characterized by a lack of growth and battles among firms for shares of shrinking market resources (Bradley et al., 2011; Castrogiovanni, 1991). Declining

markets present limited opportunities for firm innovation, flexibility, and growth (Walters et al., 2010; Palmer & Wiseman, 1999).

In munificent environments, there is an abundance of resources and new opportunities are continuously emerging (Dess & Beard, 1984). Because of strong cash positions and the availability of expansion capital, there are fewer downsides to risky strategic choices (Palmer & Wiseman, 1999). Through their strong problem-solving capacities and opportunistic lens (Chang et al., 2012; Judge & Kammeyer-Mueller, 2011), we expect that high CSE CEOs will see the benefits of increasing spending on R&D or capital improvements to garner high returns and build a competitive advance in these growing markets. When munificence is low, cash flows are reduced and the prospects for new growth opportunities are limited (Palmer & Wiseman, 1999). We expect that high CSE CEOs will surmise that the downside of taking on additional long-term debt or see little value in increasing spending on R&D or capital improvements. Conversely, the scope of market possibilities in high munificent environments and the stagnation in low munificence environments are likely to activate threat-based framing and heighten anxieties of lower CSE CEOs guided by avoidance temperaments. As a result, they are reactive as opposed to proactive in using strategic resources to gain market share.

> ***Hypothesis 5:*** Environmental munificence has a moderating effect on the relationship between CEO CSE and firm resource allocation risk taking such that the relationship is positive in munificent environments and negative in less munificent environments.

The growth in munificent environments attracts new entrants and rivalry among firms trying to gain a larger share of the growing market (Bradley et al., 2011; Palmer & Wiseman, 1999). Guided by approach temperaments, high CSE CEOs are apt to construe situations positively and motivated to realize the opportunities they are presented with (Chang et al., 2012). In munificent environments, high CSE CEOs are likely to view deviation from the evolving and

varied competitors as unnecessary to compete successfully. However, in low munificence environments they remain vigilant to the possibilities of strategic differentiation to set the firm apart from competitors. We expect munificence to activate threat-based framing and heighten anxieties among CEOs with lower levels of CSE leading to a reactive pursuit of strategies that mimic or deviate from competitors rather than proactively leveraging opportunities.

> ***Hypothesis 6:*** Environmental munificence has a moderating effect on the relationship between CEO CSE and firm strategic nonconformity such that the relationship is negative in munificent environments and positive in less munificent environments.

METHODS

Sample

Our sampling strategy entailed several steps. First, in line with Nadkarni and Chen (2014) we restricted our population to large and established public firms in the U.S. (sales ≥ $100 million USD) between 1998 and 2000 available in the COMPUSTAT database. Focusing on large public firms enabled us to obtain reliable longitudinal firm and industry data. This criterion yielded 5,502 firms. Second, we narrowed our focus to the manufacturing sector (two-digit primary SIC code: 20-39) to obtain a sample of firms that face varying levels of the environmental context factors, while controlling for broad and fundamental differences in operating and financial structures and competitive practices across sectors. This restriction resulted in 2,038 firms. Third, to minimize confounds that can occur when testing the moderating effects of the environmental context in firm-level research, we followed prior studies and chose only those firms that derived at least 70 percent of their revenues from their dominant business (Rajagopalan & Datta, 1996). This filter yielded 1,289 companies. Fourth, we identified firms for which we could determine whether that the CEO remained in office for at least the first three years of the study timeframe and then selected 120 CEOs-firms across 16 industries using a

stratified random sampling strategy to ensure a balanced representation of industries across the environmental factors. Finally, we verified the tenure of each CEO and conducted an extensive search for CEO narratives and biographical information (detailed below) for use in conducting the historiometric assessments of CEO personality. We eliminated 14 CEOs for whom we were unable to obtain sufficient information. The sample included 106 CEOs.

We collected data on CEO CSE from 1998 to 2000, the environmental context factors from 1998 to 2003, and firm resource allocation risk taking and strategic nonconformity from 1999 to 2004. This temporal separation among variables enabled us to draw inferences about the directionality of relationships. The timeframe of 1998-2004 also captured cycles of upturns and downturns in the U.S. business environment (National Bureau of Economic Research, 2013) which impact the availability of resources and the competitive landscape. Specifically, whereas economic upturns create opportunities and improve slack resources economic downturns reduce the availability of resources (Cheng & Kesner, 1997). Using a timeframe that captures both upturns and downturns improves the generalizability of our findings. The hypotheses were tested on a final sample of 106 CEOs across 597 firm-year observations from 1998-2004.

Historiometric Analysis of CEO CSE

We employed historiometric research methods. We chose this methodology, which enables researchers to conduct unobtrusive assessments of psychological characteristics (e.g., House, Spangler, & Woycke, 1991; Peterson, Smith, Martorana, & Owens, 2003) for several reasons. First, CEOs are notoriously reluctant to participate in research studies and previous attempts to survey CEOs of public companies have resulted in low response rates, potentially biasing the sample and corresponding results (Cycyota & Harrison, 2006). Historiometric methods eliminate the potential effects of low response rates (Peterson et al., 2003). Second,

primary assessments of CEO personality using self-report measures or interviews can be susceptible to social desirability and reactivity biases (Chatterjee & Hambrick, 2007); using historiometric methods allowed us to overcome these limitations. Third, these assessments are based on information from multiple sources, which provides a comprehensive, cross-situational perspective on the CEO's personality that can be evaluated by third-party assessors (Resick et al., 2009). Using multiple sources of information also overcomes problems with single sources, such as attribution biases (Salancik & Pfeffer, 1977), incomplete information regarding adverse events (Nadkarni & Barr, 2008), and framing (Fiol, 1989).

Consistent with previous historiometric studies (e.g., Peterson et al., 2003; Resick et al., 2009), we compiled comprehensive (approximately 7,000-word) information packets on each CEO. Each packet included both narratives and biographical information from multiple sources for the period 1998 to 2000. Narratives are first-hand accounts and assertions of CEOs in sources such as letters to shareholders (LTS), published interviews, speeches, and CEO press releases. Biographical information comprises secondary accounts and cross-situational information about the CEO authored by others in newspaper articles and biographies. To eliminate potential evaluator biases, all identifying information (i.e., CEO name, company name) was removed. Additionally, to reduce order effects, the order of information was randomized.

Two project team members, who were blind to the study's hypotheses and all identifying information, assessed each CEO using the 11-item adjective-based measure developed and validated by Resick et al. (2009). This measure was developed specifically for coding CEO CSE using secondary data and includes the adjectives: *confident*, *determined*, *optimistic*, *persevering*, *persistent*, *positive*, *stable*, *self-confident*, *dissatisfied* (reverse), *quitting* (reverse), and *self-pitying* (reverse). Following recommendations to enhance precision and distinguish between high

and very high levels of CSE among executives (Hiller & Hambrick, 2005; Simsek, Heavey, & Veiga, 2010), each adjective was rated on a 7-point scale (1 = *definitely not applicable* to 7 = *definitely applicable*). After completing 40 hours of skills-based training (summarized in Appendix A), each assessor evaluated approximately seven CEOs per week.

We examined interrater agreement using index r_{wg} (James, Demaree, & Wolf, 1984). The mean item-level r_{wg} ranged from .89 (uniform null distribution) to .79 (moderately skewed distribution). We examined interrater reliability using intra-class correlation coefficients; ICC(1) was .63, ICC(2) was .77, and the *F*-value from the ANOVA used to calculate the ICCs indicated greater variability in CSE ratings between CEOs than within CEOs ($F = 4.361$, $p = .038$). These results demonstrate high levels of interrater agreement and reliability. Therefore, for each CEO, we calculated item-level mean ratings across the two assessors and then averaged these item-level ratings to derive the overall CEO CSE score ($\alpha = .84$). A list of the CEOs and their CSE scores is provided in Appendix B.

Measures

Resource allocation risk taking. Consistent with our conceptualization of strategic risk taking as the proactive allocation of strategically important resources (Palmer & Wiseman, 1999) we followed prior studies (e.g., Devers, McNamara, Wiseman, & Arrfelt, 2008; Kish-Gephart & Campbell, 2015) and created a metric encompassing three strategic risks: R&D expenditures, capital expenditures, and the value of long-term debt. Consistent with the approach used by Schumacher et al. (2020), beginning with 1999, for each firm in our sample we first scaled R&D expenditures, capital expenditures, and long-term debt by dividing each by reported total assets and then created a composite score by taking the sum of the three scaled metrics. Higher scores indicate higher risk taking in the allocation of strategically important resources. We repeated

these steps for years 2000 through 2004.

Strategic nonconformity. We used an established and widely used measure of strategic nonconformity (e.g., Crossland, Zyung, Hiller & Hambrick, 2014; Finkelstein & Hambrick, 1990; Wowak, Mannor, Arrfelt, & McNamara, 2016). Nonconformity is the absolute deviation of a firm's score from industry-level means on six subcategories of strategies: (1) R&D intensity (R&D expenditures/sales); (2) advertising intensity (advertising expenses/sales); (3) plant and equipment newness (net plant and equipment/gross plant and equipment); (4) non-production overhead (selling, general, and administrative expenses/sales); (5) inventory levels (inventory/sales); and (6) financial leverage (debt/capital). We created a composite of the absolute deviation scores following three steps. First, beginning with 1999, we created a standardized score for each strategy subcategory for each of the 16 industries within the manufacturing sector (assessed at the two-digit SIC) represented in our sample using data from the sample firms. Second, we calculated the absolute deviation between a firm's score on a subcategory and the mean industry score. Third, we summed each firm's six absolute deviations to create an overall index of the firm's strategic nonconformity for that year; higher scores indicate greater strategic nonconformity. We repeated these steps for years 2000 through 2004.

Concentration. We followed Dess and Beard (1984) and measured industry concentration as the distribution of industry sales. This is a widely used measure of industry concentration (e.g., Connelly, et al., 2020; Engelen et al., 2015). Specifically, beginning in 1998, we identified the top four companies within each of the 16 industries represented in our sample at the two-digit SIC and collected sales data for each company. Next, we gathered information on sales across all companies within that industry and calculated the ratio of sales for the top four companies to industry sales. We repeated these steps for the years 1999 through 2003. A higher

index indicates a higher level of concentration within the industry. There is a one-year lag between the measures of each of the environmental contingency factors and both resource allocation risk taking and strategic nonconformity.

Dynamism. We assessed environmental dynamism using a measure of the volatility in the external environment (Bergh & Lawless, 1998). This measure has been used extensively in prior research (e.g., Gamache, Neville, Bundy, & Short, 2020; Wang & Li, 2008). We followed Bergh and Lawless' (1998) procedure to compute environmental dynamism for each year (1998-2003). Specifically, we regressed the dollar value of net industry sales at the two-digit SIC on time (1993 to 1997) to compute dynamism in 1998. Second, we divided the standard error of the regression coefficient by the average dollar value of total industry sales to compute a standardized index of environmental dynamism. We repeated this process for the years 1999 through 2003. A higher standardized index indicates a more dynamic environment.

Munificence. We assessed munificence using the average growth in industry net sales based on two-digit SIC codes over the prior five years (e.g., Dess & Beard, 1984; Gamache et al., 2020; Li & Tang, 2010). Specifically, we calculated the growth rate for industry net sales for 1993-1997 to compute munificence in 1998. We then repeated this process for the years 1999 through 2003. A higher index indicates a more munificent environment.

Control variables. We included controls for firm- and CEO-related variables to rule out alternative explanations and isolate the effects of CEO CSE. At the firm-level, we controlled for four factors including firm age, slack resources, assets, and prior year performance. As *firm age* increases, firms tend to become less entrepreneurial and flexible, and more inertial and bureaucratic (Dougherty & Hardy, 1996), in turn gravitating more toward greater risk aversion and more conformist strategies. Firms with greater *slack resources* have the resources and

leeway needed to take risks and be more innovative (Greve, 2003) than those with less slack resources. Following Cheng and Kesner (1997), we measured slack by averaging three indicators: current ratio-current assets/current reliabilities (available slack), debt-to-equity ratio (potential slack), and the general and administrative expenses to sales ratio (recoverable slack). Larger firms have an increased capacity to raise long-term debt and invest in R&D and capital expenditures (e.g., Devers et al., 2008). Therefore, we controlled for firm size using *firm assets*. Prior performance reinforces the value of existing practices (Greve, 1998) and has been associated with reduced propensity for strategic risk taking (Hoskisson et al., 2017). Consistent with prior studies of managerial risk taking (Kish-Gephart & Campbell, 2015), we controlled for past performance using ROA $_{(t-1)}$ for the year prior to the focal outcome (e.g., we controlled for ROA in 1998 for resource allocation risk taking and strategic nonconformity in 1999). Therefore, all firm-level controls represent the years 1998 through 2003.

Firm performance in comparison to aspiration levels provides CEOs with an important source of performance feedback that may influence strategic risk taking (Kuusela, Keil, & Maula, 2017; Schumacher et al., 2020). Therefore, we controlled for performance in comparison to aspiration. Prior research indicates that aspiration levels stem from two sources—historical performance and social comparison relative to peers (Greve, 2003; Kuusela et al., 2017). Consistent with Connelly et al. (2020), we calculated aspiration using metrics developed by Kuusela and colleagues (2017). Historical aspiration is defined as $A_t = \alpha P_{t-1} + (1 - \alpha) A_{t-1}$: A_t = aspiration level at time t (A_0 = performance for the first year in the data), P_{t-1} = firm ROA at time t-1, and coefficient α = the relative importance of the prior aspiration level (t-1) versus the actual prior performance (t-1). Consistent with prior studies, we used a relatively large value of α =.75 (Connelly et al., 2020; Kuusela et al., 2020) but the results are robust to α =.50 and α =.25.

For social comparison aspiration we first identified the most relevant peer companies within a particular year and based on three-digit SIC. Next, we identified the closest matching firms based on ROA and total assets by calculating the Mahalanobis distance (Mahalanobis, 1936) between the focal firm and peer firms within that year. Consistent with prior studies, we selected the five closest matches and constructed a peer group of five firms (Connelly et al., 2020; Kuusela et al., 2020). Social aspiration = the mean ROA of the five peer firms in that year. Next, we followed Connelly et al. (2020) to create a weighted overall aspiration level = α × Social aspiration + (1 – α) × Historical aspiration (α = .70). We then calculated two performance-aspiration comparison metrics. First, ROA-aspiration (above) = firm ROA minus overall aspiration level when performance is above aspiration levels and zero when performance is below aspiration. Second, ROA-aspiration (below) = the absolute value of firm ROA minus overall aspiration level when performance falls short of aspiration and zero when performance exceed aspiration. We control for performance above and below overall aspiration levels for the years 1998 through 2003.

We included controls for six CEO-level variables. As *age* and *tenure in their position* increases, CEOs become more traditional, emphasize stability, and have less motivation to take risks and pursue new ideas (Barker & Mueller 2002; Hambrick & Mason, 1984). To address differences in cognitive complexity that may influence the ability to absorb new ideas and willingness to take risks (Barker & Mueller, 2002; Li & Tang, 2010) we controlled for *CEO education* level coded along a seven-point scale: 1 = high school, 2 = attended college, 3 = undergraduate degree, 4 = attended graduate school, 5 = master's degree, 6 = attended doctoral program, 7 = doctorate (Herrmann & Datta, 2002). *CEO power* increases discretion and influence on firm strategic behaviors (Chin, Hambrick, & Treviño, 2013). We controlled for two sources of power: structural (CEO duality: 0 = CEO only, 1 = CEO and chairman of the board)

and ownership (percentage of CEO stock ownership) (e.g., Haynes & Hillman, 2010; Wang, DeGhetto, Ellen, & Lamont, 2019). Finally, executive overconfidence is associated with an overestimation of personal capabilities, control and probability of success coupled with an under estimation of the impact of external factors and the magnitude of inherent risks (Malmendier & Tate, 2005; Tang, Li, & Yang, 2012). Prior theory has argued that high levels of CSE among executives is associated with overconfidence (e.g., Chen et al., 2015; Hiller & Hambrick, 2005). Therefore, we controlled for overconfidence to address this potential relationship. Following Malmendier and Tate (2005), we measured CEO overconfidence based on their decisions regarding exercisable stock options. For each year 1998 through 2003, we calculated the natural log of the value of vested but unexercised options held by the CEO as reported in company financial reports. Executives who hold a high level of vested options are less diversified in their wealth than they should be according to finance theory and are therefore more overconfident.

Analytical Approach

Our sample consists of a longitudinal panel composed of a single observation of CEO CSE, multiple observations of each of the environmental factors (1998 - 2003), and multiple observations of firm resource allocation risk taking and strategic nonconformity (1999 - 2004). As such, we followed approaches used in recent upper echelons research (e.g., Gamache et al., 2020; Gupta, Nadkarni, & Mariam, 2019) and tested our hypotheses using generalized estimating equations (GEE) which account for the nonindependence of observations across time and provide robust parameter estimates (e.g., Ballinger, 2004; Liang & Zeger, 1986; Zeger & Liang, 1986). We mean-centered independent variables prior to analysis.

Our set of crossover interaction hypotheses propose that the effects of CEO CSE on forms of strategic risk taking are environmentally contingent changing from positive to negative

depending on the firm's operating environment. Because the direction of the predictor-outcome relationship changes across levels of the moderator for disordinal (i.e., crossover) interactions such as these, the main effects of the predictor on the outcome are not particularly informative (Aguinis, Edwards, & Bradley, 2017) and often not statistically significant (Cohen, Cohen, West, & Aiken, 2003; Gardner, Harris, Li, Kirkman, & Mathieu, 2017). Therefore, following guidelines put forth by Aguinis and colleagues (2017), we interpret and probe the CEO CSE by environmental dimension interaction terms to test our hypotheses.

RESULTS

Table 1 summarizes the descriptive statistics and correlations among the focal study and control variables. Tables 2 and 3 summarize the unstandardized coefficients, standard errors, and *p*-values for the results of the hypothesis tests.

Prior to testing our hypotheses, we first examined the correlation between CEO CSE and overconfidence. We found a small, statistically significant correlation ($r = .21$, $p < .01$) indicating that approximately 4.4% of the variance in CEO's overconfidence scores is attributable to their CSE traits (see Table 1). Using Carlson and Herdman's (2012) benchmark of $r < .50$ for establishing a lack of construct convergent validity, this finding provides some evidence that CSE and overconfidence are distinct psychological characteristics of CEOs.

Next, we examined the direct effects of CEO CSE on the set of firm risk taking strategies. The results across models indicate a weak, negative effect that was not statistically significant ($p > .05$) for either resource allocation risk taking (Table 2) or strategic nonconformity (Table 3). The lack of statistical significance is not surprising given that main effects are often not statistically significant in tests of crossover interactions and our theory suggests that the effects of CEO CSE are highly environmentally contingent. These findings support our assertion that

higher CSE CEOs are not universally bold risk seekers across contexts. We turn now to testing the hypothesized environmentally contingent effects.

Hypothesis 1 proposed that the effects of CEO CSE on firm resource allocation risk taking are contingent upon industry concentration such that the relationship trends negative in high concentration industries and positive in low concentration industries. As shown in Model 1 of Table 2, industry concentration (coef. = -.051, p = .810) was not directly related to resource allocation risk taking. However, the coefficient for the CSE by concentration interaction was statistically significant (coef. = -1.353, p = .007). To interpret the effects, we graphed the relationship between CEO CSE and resource allocation risk taking at higher (+1SD) and lower (-1SD) levels of industry concentration. As displayed in Figure 2, the effects of CEO CSE trend negative in higher concentration industries and positive in lower concentration industries. Therefore, Hypothesis 1 was supported.

Hypothesis 2 proposed that the effects of CEO CSE on firm strategic nonconformity are also dependent on industry concentration with the relationship trending positive as concentration increases and negative as concentration decreases. As shown in Model 1 of Table 3, industry concentration (coef. = 2.553, $p < .001$) had a statistically significant main effect on strategic nonconformity, but the CSE by concentration interaction was not statistically significant (coef. = -0.512, p = .730). Therefore, Hypothesis 2 was not supported.

Hypothesis 3 proposed that the relationship between CEO CSE and resource allocation risk taking is contingent on the dynamism inherent in the firm's competitive environment such that the relationship is negative in more dynamic environments and positive in less dynamic environments. As shown in Model 2 of Table 2, while environmental dynamism was not related to resource allocation risk taking (coef. = -0.071, p = .879), the coefficient for the CSE by

dynamism interaction was statistically significant (coef. = -3.357, p = .005). We then graphed the relationship between CEO CSE and resource allocation risk taking at high (+1SD) and low (-1SD) levels of dynamism. Supporting Hypothesis 3, the effects of CEO CSE trend negative in more dynamic environments and positive in less dynamic environments (see Figure 3a).

Hypothesis 4 proposed that the effects of CEO CSE on firm strategic nonconformity are contingent on environmental dynamism trending positive in higher dynamism environments and negative in lower dynamism environments. As shown in Model 2 of Table 3, while dynamism was unrelated to strategic nonconformity (coef. = 0.512, p = .714), the CSE by dynamism interaction was statistically significant (coef. = 8.522, p = .018). We graphed the relationship between CEO CSE and strategic nonconformity at high (+1SD) and low (-1SD) levels of dynamism to interpret the effects. Supporting Hypothesis 4 (see Figure 3b), the effects of CEO CSE trend positive in more dynamic environments and negative in less dynamic environments.

Hypothesis 5 proposed that the effects of CEO CSE on firm resource allocation risk taking are contingent upon environmental munificence with the relationship trending positive in munificent environments and negative in less munificent environments. Neither munificence (coef. = -.051, p = .432) nor the CSE by munificence interaction (coef. = -.145, p = .314) were statistically significant (see Table 2, Model 3). Therefore, Hypothesis 5 was not supported.

Hypothesis 6 again proposed a crossover effect of CEO CSE on firm strategic nonconformity such that the relationship trends negative in munificent environments and positive in less munificent environments. Neither munificence (coef. = .066, p = .738) nor the CSE by munificence interaction (coef. = -0.112, p = .797) were statistically significant (See Table 3, Model 3). Therefore, Hypothesis 6 was not supported.[1]

In addition, the results of a series of robustness analyses (see Appendix D) suggest that

neither endogeneity nor sample selection bias are a serious threat to the study's conclusions.

CEO Narratives

Finally, we re-visited our CEO information packets to examine quotes from CEOs that experienced higher or lower levels of industry concentration and environmental dynamism. Selected CEO quotes displayed in Table 4 illustrate how CEOs with different levels of CSE construed and responded to their firm's competitive environment.

DISCUSSION

This study presents an environmentally contingent view of the effects of CEO CSE on two forms of strategic risk taking—resource allocation risk taking and strategic nonconformity. Our findings demonstrate that high CSE CEOs differentially pursue risks depending on the form of risk and the degree of concentration and dynamism inherent in the firm's competitive environment but not based on environmental munificence. CEO CSE was negatively associated with resource allocation risk taking in both high concentration and high dynamism environments while a positive trend was found in low concentration and low dynamism environments. Alternatively, CEO CSE was positively related to the pursuit of strategic nonconformity in high dynamism environments and negatively related to the pursuit of strategic actions that deviate from competitors in low dynamism environments. Concentration did not moderate the effects of CEO CSE on strategic nonconformity, and instead exerted a positive main. Interestingly, munificence did not moderate the effects of CEO CSE on either form of strategic risk taking. In munificent environments with an abundance of available opportunities, the breath of strategic attention is essential for firms to recognize and leverage unique opportunities (Eklund & Mannor, 2021). As such, high CSE CEOs may recognize the need to focus on broader strategic issues beyond risk taking in munificent environments.

The theoretical mechanisms underlying the proposed environmentally contingent effects of CEO CSE on firm risk taking strategies are approach and avoidance temperaments. However, we did not explicitly examine the approach and avoidance temperaments of CEOs in the main study nor did we demonstrate that the positive self-views associated with CSE are distinct from inflated and grandiose self-views associated with narcissism. Therefore, we conducted two supplementary studies, one with a sample of working adults and one with a sample of senior executives from Fortune Global 1000 companies. The results from these supplemental studies, which are summarized in Appendix C, supported the connection between CSE and underlying approach (positive) and avoidance (negative) temperaments. Together the findings indicate that high CSE CEOs (with high approach and low avoidance temperaments) are responsive and adaptive to environmental cues, pursuing or refraining from risk taking to capitalize on opportunities in the firm's competitive environment. We discuss the theoretical implications for CEO positive self-regard, examine study limitations, and provide directions for future research.

Theoretical Implications

Our research sheds light on the implications of CEO CSE for strategic risk taking, indicating that the relationship is nuanced and environmentally contingent. Upper echelons researchers have portrayed high CSE executives as exceedingly confident leaders who overestimate their own capabilities, underestimate the implications of environmental factors, and have a penchant for pursuing bold, high-risk strategies to garner high potential returns (e.g., Engelen et al., 2015; Haleblian et al., 2007; Hiller & Hambrick, 2005). Our findings indicate that this branding of high CSE CEOs as bold risk seekers may not be warranted. Micro-level studies have also emphasized that high CSE individuals respond constructively to performance feedback (Bono & Colbert, 2005) and are skilled at identifying and pursuing emerging opportunities

(Chang et al., 2012). In turn, they approach strategic decisions with a sense of controlled confidence, self-assuredness and resilience in pursuing risks that exploit those opportunities while refraining from risks that may undermine success. Our findings also indicate value in examining strategic risk taking from multiple perspectives. Examining only one form of strategic risk taking provides an incomplete view that could lead to erroneous conclusions about the effects of executive psychological characteristics on managerial risk taking across environments.

Our study also provides an alternative view of the interface between CEOs and their firm's competitive environment, which has been predominantly explained by managerial discretion theory (Hambrick & Finkelstein, 1987). Specifically, managerial discretion refers to a "latitude of managerial action" to make decisions and take actions with minimal constraints (Hambrick & Finkelstein, 1987: 371). The high approach temperaments of high CSE CEOs provide a source of agency of the situation (Zaccaro, Green, Dubrow, & Kolze, 2018) through their vigilance to strategic stimuli, and capacity to devise strategies that position their firms to compete successfully. High CSE CEOs view their environments through an opportunistic lens, possess a sense of controllability over their circumstances and strive to achieve superior firm performance by pursuing strategic risks well-suited to the competitive landscape. In contrast, CEOs with lower levels of CSE myopically focus on negative strategic stimuli missing key opportunities, see circumstances as less controllable, use dysfunctional decision strategies, and advance firm strategies that are misaligned with the competitive environments. Our finding that high CSE CEOs are adept at identifying and realizing environmental opportunities offers a promising new direction for research.

Together, the findings of this study highlight the importance of distinguishing a CEO's positive self-regard rooted in CSE from a positive self-regard stemming from an inflated sense of

self (e.g., hubris, narcissism, overconfidence) because they are conceptually distinct and have different ramifications for firm strategies. Whereas high CSE CEOs are attentive to their firm's competitive environments and calculated in their risk taking, CEOs with an inflated sense of self lead their organizations in pursuit of grandiose strategies with little regard for strategy-environment alignment (e.g., Gerstner et al., 2013; Li & Tang, 2010). To isolate the effects of CEO CSE and provide a more stringent test of its effects, we controlled for CEO overconfidence in the hypothesis tests. Importantly, our findings indicate a relatively weak relationship between CSE and overconfidence, and we find the same pattern of results with or without controlling for overconfidence in the hypothesis tests. Furthermore, the findings from the supplemental studies lend support to our assertions that high CSE is rooted in high approach and low avoidance temperaments. Therefore, our findings provide new insights into a CEO's positive self-regard highlighting the implications of CSE for adaptive as opposed to maladaptive strategic behavior.

Limitations, Strengths, and Future Directions

As with all research, the findings should be interpreted in light of the study's limitations. First, ratings of CEO CSE are based entirely on archival information. While this method provides an unobtrusive tool for studying personality that overcomes self-presentation biases, the assessments could be distorted because of presentation or framing biases present in CEOs' letters to shareholders, interviews, or public interactions. While narrative information, particularly from letters to shareholders and earnings call, has been used extensively in the examination of executive personality characteristics such as the Big Five traits (Harrison, Thurgood, Boivie & Pfarrer, 2019), narcissism (Chatterjee & Hambrick, 2007), and regulatory focus (Gamache, McNamara, Mannor, & Johnson, 2015), the narratives could be crafted to create an ideal image of the CEO that disguises the executive's true personality. To counter this potential source of

bias and to provide a broad basis for assessing CSE we also included biographical information. However, this biographical information could also be impacted by writer biases. Future research could expand the understanding of CEO CSE (and other psychological traits) by using multiple methods that include some combination of historiometric analyses, ratings from analysts, CEO self-reports, and ratings from colleagues to provide a comprehensive assessment. At the same time, while we have emphasized the positive strategic implications of CEO CSE, high levels of any trait (including CSE) may not always be beneficial, particularly when applied to executives who deal with broad-scope strategic issues (Judge et al., 2009). Future research should aim to provide empirical insights into the potential negative implications of CEO CSE.

Second, there is a potential for reverse causality in the relationship between CEO CSE and strategic risk taking. The social roles people occupy (e.g., leader, sales associate, teacher) and associated goals (e.g., influencing, persuading, developing) may induce intra-individual variability in personality that shapes one's global personality traits over time (Heller, Komar, & Lee, 2007; Heller, Perunovic, & Reichman, 2009). For example, the transition from an individual contributor to a leader role has been linked to small but significant growth in conscientiousness over time (Li et al., 2021). The transition from the senior leader ranks to upper echelon levels may foster growth in CSE traits as individuals take on increasing levels of complexity and risk. Therefore, CEOs' strategic risk taking may shape their levels of CSE over time rather than CEO CSE levels influencing strategic risk taking as our theory suggests. Our design cannot rule out this possibility. An interesting direction for future research would be to model the change in CSE levels among newly named first time CEOs over the first 5 years of their tenure to determine if job demands of the CEO role stimulate growth in CSE.

Third, we assessed the firm's competitive environment based on three factors—

concentration, dynamism, and munificence—that have a rich tradition in upper echelons research (e.g., Hoskisson et al., 2017; Walters et al., 2010) using established and widely used archival financial metrics (e.g., Gamache et al., 2020; Li & Tang, 2010). While this approach provided an objective gauge of the level of concentration, dynamism, and munificence in the firm's competitive environment, it does not capture the CEOs' perceptions of these environmental features or their construal of the competitive environment in terms of opportunity/threat framing, risk-return balance, or controllability. While we highlight these perceptual mechanisms in theorizing why higher CSE CEOs pursue high risk in some competitive environments and low risk strategies in others, we do not test the perceptual mechanisms directly. Future studies should examine the roles of opportunity versus threat framing of environmental cues, perceptions of risk-reward trade-offs, and the perceived controllability of circumstances to better understand the connection between CEO CSE and the pursuit of strategic risks.

Fourth, our sample included only large, established, publicly traded U.S. companies. The environmental demands, competitive pressures, and risks that CEOs of smaller firms or start-ups face may differ from the issues that CEOs in our sample face (Ling, Simsek, Lubatkin & Veiga 2008). Therefore, the extent to which the pattern of findings is generalizable to smaller, private organizations where CEOs are likely to have a stronger impact on organizational behavior and strategic direction (e.g., Giberson, Resick, & Dickson, 2005; Nadkarni & Herrmann, 2010) is unclear. Future research should examine the strategic implications of CEO CSE in a broader range of organizations at different stages in their lifecycle.

Fifth, we test our hypotheses on a relatively small sample of CEOs using an overall 7-year time horizon across the environmental factors and strategic risk taking variables. We took steps to minimize bias in constructing the final sample which was selected from firms with two-

digit primary SIC code 20-39 where the CEO remained at least three years. As the historiometric analyses were highly labor intensive, this sampling strategy enabled us to test the hypotheses on a small, but representative sample of CEOs. In addition, the years 1998-2003 provide a narrow 6-year perspective on competitive conditions that CEOs must navigate between. Likewise, the years 1999-2004 also provide a narrow view of the environmental contingencies on CEOs' strategic risk taking. However, a strength of this timeframe is that it captured the economic upturns from 1998-2000, sharp downturns from 2001-2003 and a new cycle of upturns beginning in the third quarter of 2003. Using a timeframe that captures cycles of upturns and downturns helps to improve the generalizability of our findings. With that said, wide fluctuations in the global economy occurred between 2004 and 2010, and our study provides no insights into how high CSE CEOs navigated the competitive environment during this time. After 2004, the number of executives in our sample who left the CEO role increased substantially which restricts the sample of CEOs who remain in office. The robustness of these findings to a larger sample of CEOs in different industries across a larger timeframe is uncertain and should be examined in future research. Relatedly, we assessed the environmental factors and strategic nonconformity using broad two-digit SIC categories. Adjusting the SIC categories to three- or four-digits provides a restrictive view of each industry that may fails to account for competitive factors affecting the broader industry category. Therefore, we use two-digit SIC categories in the current study. Future research should use three or four digit SIC categories to provide a more refined view of the environmental contingencies on the implications of CEO CSE for strategic risk taking in a larger sample of CEOs across a longer timeframe.

Conclusion

Our theory and findings shift the understanding of high CSE CEOs from bold decision

makers who pursue high-risk, high-return strategies across environments to calculated risk takers motivated to pursue or refrain from strategic risks to capitalize on opportunities afforded by the firm's environment. By highlighting their high approach/low avoidance temperaments, capacity to discern environment opportunities, and the nuanced relationship with strategic risks, our study provides conceptual clarity on the strategic implications of CEO CSE. We hope that these findings stimulate further research on CSE as a unique aspect of a CEO's positive self-regard.

NOTES

[1] As a robustness check, we removed CEO overconfidence as a control variable and re-ran the analyses to test each of the hypotheses. The revised results without controlling for CEO overconfidence were consistent with the main results reported in the tables.

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Table 1

Descriptive statistics and correlation coefficients

	Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	Control variables																			
1	CEO stock ownership	0.03	0.06																	
2	CEO duality	0.72	0.38	-0.10																
3	CEO age	56.13	8.52	0.22	0.11															
4	CEO tenure	12.93	9.75	0.43	0.03	0.59														
5	CEO education	4.51	1.36	0.14	-0.12	0.01	0.00													
6	CEO overconfidence	6.55	4.73	-0.21	0.13	-0.08	-0.15	-0.03												
7	Firm age	52.13	35.42	-0.09	0.24	0.01	-0.21	0.07	-0.08											
8	Firm slack resources	0.57	0.83	0.07	-0.03	0.16	0.18	0.00	0.03	-0.08										
9	Firm assets	4,813	15,128	-0.08	0.11	0.05	-0.12	0.19	0.15	0.25	-0.06									
10	Prior year ROA	0.07	0.08	-0.03	0.02	0.07	0.11	-0.01	0.11	0.04	-0.11	0.05								
11	ROA-aspiration (above)	0.03	0.03	-0.01	-0.08	0.03	0.08	-0.05	0.00	-0.04	-0.02	-0.01	0.71							
12	ROA-aspiration (below)	0.04	0.13	-0.04	0.02	-0.06	-0.11	0.04	-0.06	-0.05	0.05	0.01	-0.52	-0.27						
	Main variables																			
13	CEO CSE	5.66	0.39	-0.08	0.06	-0.11	0.03	-0.01	0.21	-0.13	0.02	0.06	0.07	0.04	-0.02					
14	Resource allocation risk taking	0.27	0.13	-0.14	-0.05	-0.19	-0.26	-0.06	-0.01	0.04	0.00	-0.09	-0.29	-0.22	0.15	-0.05				
15	Strategic nonconformity	2.89	1.60	0.05	-0.05	0.00	0.00	-0.03	-0.12	-0.08	-0.40	-0.03	0.05	0.14	0.15	-0.03	-0.04			
16	Dynamism	0.02	0.01	0.03	-0.06	-0.01	-0.09	0.04	0.08	-0.10	0.11	0.26	-0.14	-0.13	0.07	0.00	0.05	-0.09		
17	Concentration	0.05	0.03	-0.02	0.12	0.09	-0.12	-0.10	-0.02	0.04	0.07	0.08	-0.02	-0.05	-0.08	-0.17	0.04	0.04	0.13	
18	Munificence	0.06	0.10	-0.03	0.02	-0.01	-0.04	0.06	0.03	0.03	0.11	0.15	-0.17	-0.14	0.07	0.00	-0.02	-0.17	0.26	0.10

n = 106 CEOs (597 CEO-firm observations)

Correlations greater than $|0.09|$ are statistically significant at $p < 0.05$; correlations greater than $|0.13|$ are statistically significant at $p < 0.01$.

Table 2
GEE results predicting resource allocation risk taking

	Model 1		Model 2		Model 3	
Variables	Coef. (SE)	p-value	Coef. (SE)	p-value	Coef. (SE)	p-value
Constant	0.029 (0.019)	0.130	0.040 (0.019)	0.029	0.041 (0.019)	0.028
Control variables:						
CEO stock ownership	-0.158 (0.098)	0.105	-0.189 (0.099)	0.055	-0.164 (0.098)	0.094
CEO duality	-0.015 (0.015)	0.292	-0.020 (0.014)	0.157	-0.020 (0.014)	0.161
CEO age	-0.001 (0.001)	0.097	-0.001 (0.001)	0.418	-0.001 (0.001)	0.170
CEO tenure	-0.002 (0.001)	0.033	-0.002 (0.001)	0.006	-0.002 (0.001)	0.017
CEO education	-0.005 (0.004)	0.236	-0.006 (0.004)	0.087	-0.006 (0.004)	0.132
CEO overconfidence	-0.001 (0.001)	0.641	-0.001 (0.001)	0.798	0.000 (0.001)	0.849
Firm age	0.000 (0.000)	0.487	0.000 (0.000)	0.664	0.000 (0.000)	0.467
Firm slack resource	0.018 (0.009)	0.052	0.023 (0.009)	0.009	0.023 (0.009)	0.011
Firm assets	0.006 (0.005)	0.268	0.006 (0.005)	0.224	0.007 (0.005)	0.180
Prior year ROA	-0.520 (0.111)	<.001	-0.493 (0.110)	<.001	-0.487 (0.111)	<.0001
ROA-aspiration (above)	-0.092 (0.264)	0.726	-0.177 (0.262)	0.501	-0.162 (0.264)	0.539
ROA-aspiration (below)	-0.033 (0.047)	0.484	-0.034 (0.047)	0.460	-0.027 (0.047)	0.557
Main variables:						
CEO CSE	-0.011 (0.014)	0.407	-0.018 (0.013)	0.182	-0.014 (0.013)	0.313
Concentration	-0.051 (0.210)	0.810				
CEO CSE * Concentration	-1.353 (0.498)	0.007				
Dynamism			-0.071 (0.463)	0.879		
CEO CSE * Dynamism			-3.357 (1.198)	0.005		
Munificence					-0.051 (0.065)	0.432
CEO CSE * Munificence					-0.145 (0.144)	0.314
Year Dummies	Included		Included		Included	
Wald χ^2	134.06**		134.34**		126.65**	

n = 597 CEO-year observations. ** $p < .01$. Coefficients are unstandardized. Standard errors appear in parentheses.

Table 3
GEE results predicting strategic nonconformity

Variables	Model 1 Coef. (SE)	Model 1 p-value	Model 2 Coef. (SE)	Model 2 p-value	Model 3 Coef. (SE)	Model 3 p-value
Constant	0.494 (0.058)	<0.001	0.459 (0.056)	<0.001	0.459 (0.056)	<0.001
Control variables:						
CEO stock ownership	0.025 (0.291)	0.932	0.135 (0.297)	0.650	0.077 (0.295)	0.794
CEO duality	-0.006 (0.044)	0.896	0.023 (0.043)	0.591	0.020 (0.043)	0.639
CEO age	0.001 (0.003)	0.717	0.002 (0.002)	0.473	0.003 (0.002)	0.215
CEO tenure	0.002 (0.002)	0.379	0.000 (0.002)	0.907	-0.001 (0.002)	0.798
CEO education	0.012 (0.011)	0.277	0.010 (0.011)	0.398	0.008 (0.011)	0.488
CEO Overconfidence	-0.002 (0.003)	0.572	-0.002 (0.003)	0.550	-0.002 (0.004)	0.513
Firm age	0.000 (0.000)	0.709	0.000 (0.001)	0.677	0.000 (0.000)	0.882
Firm slack resource	0.027 (0.027)	0.321	0.034 (0.027)	0.209	0.035 (0.027)	0.202
Firm assets	-0.034 (0.015)	0.024	-0.042 (0.015)	0.007	-0.042 (0.015)	0.006
Prior year ROA	0.094 (0.331)	0.777	0.140 (0.332)	0.673	0.106 (0.334)	0.750
ROA-aspiration (above)	2.131 (0.787)	0.007	2.023 (0.792)	0.011	1.989 (0.795)	0.012
ROA-aspiration (below)	0.708 (0.140)	<0.001	0.667 (0.141)	<0.001	0.644 (0.141)	<0.001
Main variables:						
CEO CSE	-0.055 (0.040)	0.168	-0.070 (0.040)	0.083	-0.076 (0.041)	0.058
Concentration	2.553 (0.626)	<0.001				
CEO CSE * Concentration	-0.512 (1.484)	0.730				
Dynamism			0.512 (1.397)	0.714		
CEO CSE * Dynamism			8.522 (3.612)	0.018		
Munificence					0.066 (0.196)	0.738
CEO CSE * Munificence					-0.112 (0.434)	0.797
Year Dummies	Included		Included		Included	
Wald χ^2	707.70**		769.84**		668.12**	

n = 597 CEO-year observations. ** $p < .01$. Coefficients are unstandardized. Standard errors appear in parentheses.

Table 4

Quotes from CEOs

Competitive Environment	Higher CSE	Lower CSE
Concentration		
Higher	Bill Greehey, Valero (LTS, 1998): *Valero has developed key advantages that set us apart from other refiners. We are recognized throughout the industry for the creative and innovative way we operate our refineries, which allows us to maximize our profitability by increasing capacity and yields.*	Christopher Twomey, Arctic Cat Inc. (LTS, 1999) *We are very much aware of the new opportunities that exist for expanding sales of some consumer products. However. we still believe that. for the foreseeable future. our sales will be made predominantly through our independent dealer network. We are committed to working closely with our dealers....*
Lower	Daniel Warmenhoven, Network Appliance, Inc (LTS, 2000): *The Internet revolution and the rise of enterprise computing have fueled an explosion. In the volume and complexity of data, and companies of every size today face the pressing need to manage data effectively. These trends have been major drivers of our own growth at NetApp. Our cost-effective solutions have become a core component of the IT infrastructure because the benefits we deliver-simplicity, flexibility, reliability, and scalability-are ideally suited for Internet and enterprise customers.*	Sheldon Erikson, Cameron International (LTS, 1998): *Our geographic diversity gives us the same benefits that an investor gleans from spreading his risk among a variety of investment vehicles. Declining activity in particular regional markets generally has only a limited impact on the collective performance of a company with the international exposure of Cooper Cameron. And while we operate in more than 100 countries, our financial risk is minimized by trading primarily in U.S. dollars and relatively stable European currencies.*
Dynamism		
Higher	Eli Harari, SanDisk (LTS, 1998): *Competition is expected to remain fierce as growth in our target markets attracts large technology investments from competitors. The key to retaining our market leadership position is continued execution of our advanced technology development roadmap.*	William O'Hagan, Mueller Industries (LTS, 1999): *Our strategy is to concentrate on our areas of skill and expertise, where we can leverage our existing manufacturing, sales, and distribution capabilities. An acquisition should strengthen a core business, creating economies of scale, extending a product line, or opening new markets. We will only consider a purchase in an unrelated area under special circumstances*
Lower	Terry Growcock, Manitowoc Co. (LTS, 1998): *Our strategy is to grow our core businesses by improving what we do-and by doing it better than ever before. We are blessed with opportunities. Success will come from selecting the best of these, and by executing efficiently and aggressively to make them pay off.*	Morgans Bay, Valmont Industries (LTS, 1998): *As we are creating a worldwide network of plants and capabilities, let me emphasize that we are being prudent in our international investment strategies. We are planting "seeds of opportunity" by making limited investments until we have established ourselves and better understand these new markets.*

Figure 1

Model of the contingent effects of environment factors on the relationships between CEO core self-evaluations and firm risk taking strategies

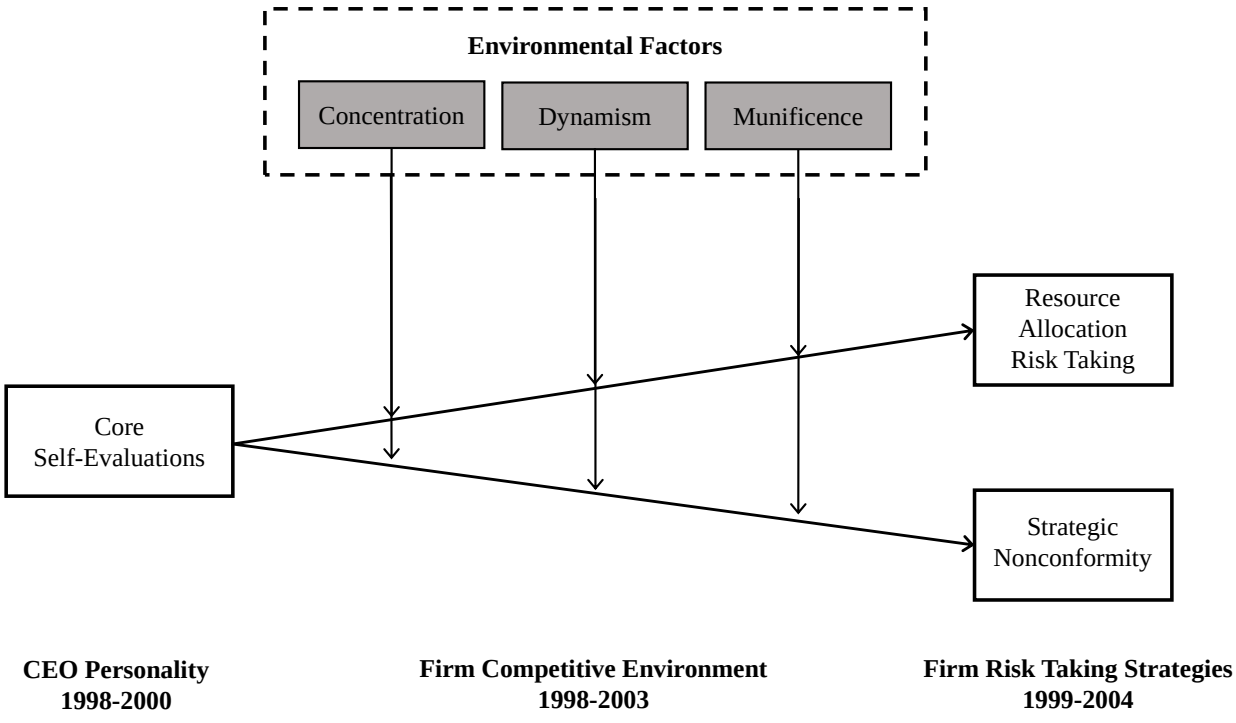
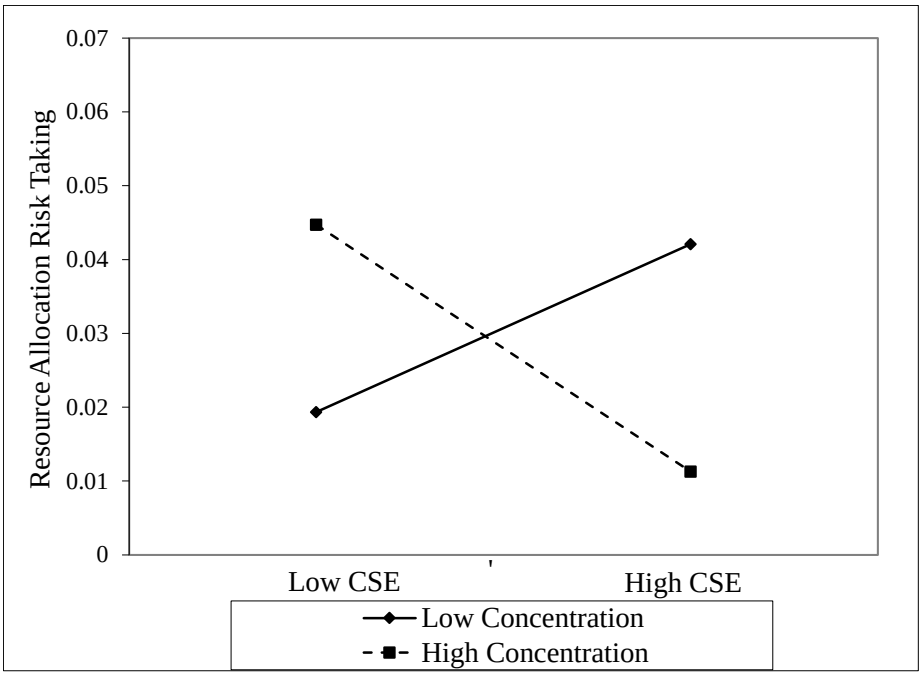


Figure 2

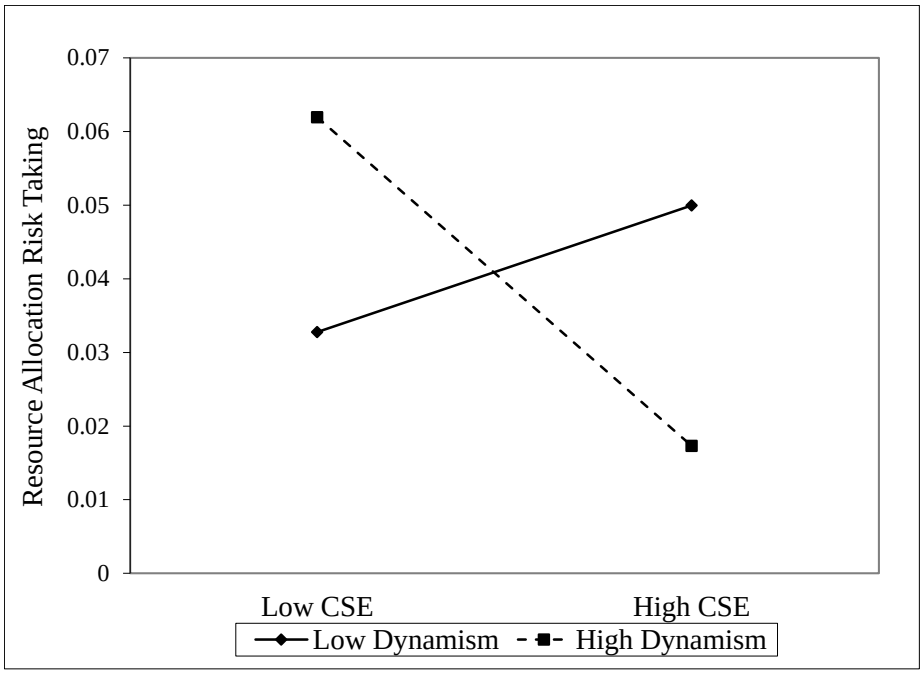
Interaction plots depicting the moderating effects of environmental concentration



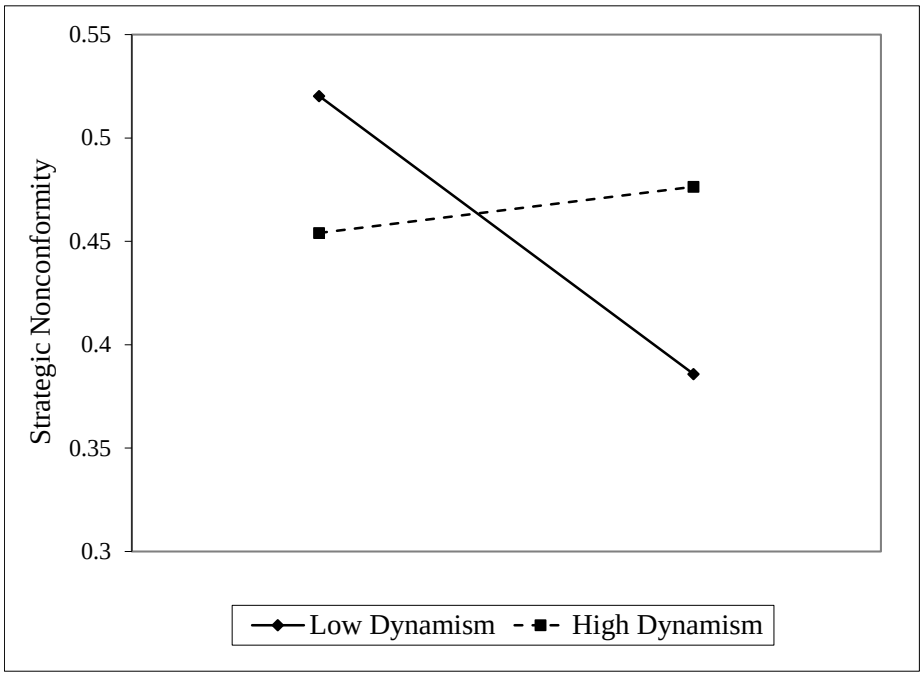
Relationship between CEO CSE and firm resource allocation risk taking in low concentration (-1 SD) and high concentration environments (+1 SD).

Figure 3

Interaction plots depicting the moderating effects of environmental dynamism



3a. Relationship between CEO CSE and firm resource allocation risk taking in low (-1 SD) and high dynamism environments (+1 SD).



3b. Relationship between CEO CSE and firm strategic nonconformity in low (-1 SD) and high dynamism environments (+1 SD).

Appendix A—Historiometric Analysis Training and Supplemental Analyses

For the historiometric analyses, the assessors first completed approximately 40 hours of training involving background reading, practice assessments and face-to-face group discussions to provide the assessors with the knowledge and skills needed to complete the assessments. For the first two training sessions, the assessors completed background readings on personality and leadership. The actual training sessions involved group discussion of the readings, along with a review of the CEO information packets, personality assessment forms, the rating process, common evaluation errors and judgmental biases (e.g., contrast effects, primacy/recency effects, halo/horn effects, leniency/harshness bias), and frame-of-reference training regarding the meaning of the scale items and scale anchors. For the next four training sessions, the assessors were assigned a practice assessment per session in which they evaluated a CEO who was not included in the study. The information packets for these CEOs mirrored the content and structure of the information packets in the main study. Each assessor coded the information independently. Then, the project team met for approximately two hours to clarify interpretational and definitional issues and discuss areas of agreement and disagreement. Assessors could modify their ratings but were not required to do so. Throughout the course of the practice assessments, we continuously discussed and refined the interpretation of the personality items, rating scale anchors and the information packet materials. After the fourth practice assessment, it was clear to the project team that the assessors developed a common frame of reference. At the seventh and final training meeting, the assessment process and materials were reviewed one last time, an assessment schedule was developed, and assessors received written guides that summarized the interpretations of personality items, rating scale anchors and rating bias definitions. Each assessor held an MBA degree; one assessor also held a PhD degree in Management and one

assessor was a student enrolled in a doctoral program in Management.

To assess the robustness of the CEO information packets, we examined the comparability of the narrative and biographical information. To do so, we conducted a supplemental analysis of 12 randomly selected CEOs. We found a strong, positive correlation between the ratings based on each source (r = .66, p = .02) indicating that while a high degree of correspondence exists, each source contributes unique information about the CEO's psychological characteristics.

We also conducted a supplementary analysis to determine the distinctiveness of the historiometric ratings of CEO CSE from historiometric ratings of extraversion (a Big-Five psychological trait). Drawing on Costa and McCrae's (1992) mapping of adjectives from the Gough Adjective Checklist (Gough & Heilbrun, 1965) to each Big Five facet we identified six adjectives (*Adventurous, Enthusiastic, Humorous, Outgoing, Shy, Talkative*) to assess extraversion (α = .77). The same two coders rated each CEO and acceptable levels of interrater agreement and reliability were again found. In line with previously reported relationships (e.g., Chang et al., 2012; Judge et al., 2003), CSE ratings were positively correlated with extraversion ratings (r = .62, p < .001). Next, we created item parcels (five parcels for CSE and three parcels for extraversion) and conducted a series of confirmatory factor analyses (CFA). First, we specified a 2-factor model including ratings of CSE and extraversion with each parcel loading only on its intended latent factor and all error terms independent. This 2-factor model fit the data reasonably well $\chi^2(19) = 59.89$, $p < .001$, CFI = .92, SRMR = .071 and better than a one-factor model $\chi^2(20) = 90.58$, $p < .001$, CFI = .88, SRMR = .085, $\Delta\chi^2$ (1) =30.69, $p < .001$. All parcels loaded on their respective latent factor to a statistically significant degree. The analyses indicate that the historiometric ratings of CEO CSE and extraversion are related, yet distinct.

Appendix B—CEO Core Self-Evaluation Scores

CEO Name	Firm Name	CSE Score	CEO Name	Firm Name	CSE Score
Miles D. White	Abbott Laboratories	5.95	Dave Kolb	Mohawk Industries Inc	5.59
Howard B. Bernick	Alberto-Culver Co	6.09	R.T. Brady	Moog Inc	5.55
Jerald G. Fishman	Analog Devices	6.14	William D. O'Hagan	Mueller Industries	5.50
Allen Andreas	Archer Daniels Midland Co	5.50	Claiborne P. Deming	Murphy Oil Corp	5.91
Christopher Twomey	Arctic Cat Inc	4.55	Alfred Rankin Jr.	Nacco Industries	5.41
George Perlegos	Atmel Corp	5.32	Melvin S. Cohen	National Presto Industries	5.27
Robert J. Khoury	B/E Aerospace Inc	5.32	Brian Halla	National Semiconductor	5.32
Nolan D. Archibald	Black & Decker Corp	6.32	Scott Rudolph	NBTY Inc	5.68
John F. Fiedler	BorgWarner Inc	6.05	Daniel J. Warmenhoven	NetApp Inc	6.14
Pete Nicholas	Boston Scientific Co	5.86	Rick Hill	Novellus Systems Inc	5.91
Ronald A. Fromm	Brown Shoe Co Inc	5.82	Robert G. Bohn	Oshkosh Corp	5.86
Owsley Brown II	Brown-Forman	5.86	J. Hicks Lanier	Oxford Industries Inc	4.50
Gordon Harnett	Brush Engineered Materials	5.91	Mark C. Pigott	PACCAR Inc	5.95
Sheldon R. Erikson	Cameron International	4.59	Eric Krasnoff	Pall Corp	5.64
John Jackson	Celgene	5.77	Winslow Buxton	Pentair Inc	5.86
Robert J. Shillman	Cognex Corp	6.45	Gregory L. Summe	PerkinElmer Inc	5.86
A. Reuben Mark	Colgate-Palmolive Co	6.05	Bruce Klatsky	Phillips-Van Heusen	5.73
Stanley A. Rabin	Commercial Metals	4.82	Michael J. Critelli	Pitney Bowes Inc	5.82
Walter J. Zable	Cubic Corp	5.64	Raymond W. LeBoeuf	PPG Industries Inc	5.18
T.J. Rodgers	Cypress Semiconductor Corp	5.55	Dr. Irwin Jacobs	Qualcomm Inc	6.45
A. Blaine Bowman	Dionex Corp	5.95	Robert McKnight	Quiksilver Inc	6.05
Raymond Royer	Domtar Corp	5.91	Derrick N. Key	Roper Industries Inc	5.82
William G. Van Dyke	Donaldson Co Inc	5.73	Eli Harari	SanDisk Corp	6.00
Thomas L. Reece	Dover Corp	5.73	Jure Sola	Sanmina-Sci Corp	5.86
Chad Holliday	DuPont	6.09	James Bernhard	Shaw Group Inc	6.36
M. Farooq Kathwari	Ethan Allen Interiors Inc	5.95	Robert O'Toole	Smith (A. O.) Corp	5.55
Lee R. Raymond	Exxon Mobile Corp	5.73	Doug Rock	Smith International	5.77
Howard Solomon	Forest Laboratories	5.86	Richard Smucker	Smucker (JM) Co	5.64
Mickey Holliman	Furniture Brands Intl	4.95	John Blystone	SPX Corp	5.95
Ross J. Centanni	Gardner Denver Inc	4.91	Keith E. Busse	Steel Dynamics Inc	5.64
Steve Sanger	General Mills Inc	5.82	James P. Hackett	Steelcase Inc	5.86
Fred T. Bauer	Gentex Corp	5.91	John Brown	Stryker Corp	5.95
Henri A. Termeer	Genzyme Corp	5.91	William B. Ruger	Sturm Ruger & Co Inc	6.14
Michael J. Gasser	Greif Inc	5.18	Scott G. McNealy	Sun Microsystems Inc	6.00
Derek C. Hathaway	Harsco Corp	5.68	Louis L. Borick	Superior Industries Intl	5.59
William Johnson	Heinz H. J. Co	5.91	Todd Herrick	Tecumseh Products Co	4.91
John B. Hess	Hess Corp	5.27	Bruce A. Smith	Tesoro Corp	5.64
Joel Johnson	Hormel Foods Corp	5.45	Lewis B. Campbell	Textron Inc	5.05
W. James Farrell	Illinois Tool Works	5.50	Richard F. Syron	Thermo Fisher Scientific	5.41
Alexander Lidow	Intl Rectifier Corp	5.50	Jeffrey Swartz	Timberland Co	5.14
Malachi Mixon	Invacare Corp	5.82	W. R. Timken Jr.	Timken Co	5.50
Gerald B. Shreiber	J & J Snack Foods Corp	5.77	Melvin J. Gordon	Tootsie Roll Industries Inc	5.59
Paul A. Stroup	Lance Inc	4.95	Kendrick Melrose	Toro Co	5.59
Robert Swanson	Linear Technology Corp	5.59	William C. Foote	USG Corp	5.55
Paul R. Charron	Liz Claiborne Inc	5.23	Bill Greehey	Valero Energy Corp	6.18
Terry D. Growcock	Manitowoc Co	6.09	Mogens Bay	Valmont Industries	5.55
Richard A. Manoogian	Masco Corp	5.00	Mackey J. McDonald	VF Corp	6.09
John F. Gifford	Maxim Integrated Pro	5.59	Patrizio Vinciarelli	Vicor Corp	5.27
Klaus von Horde	MEMC Electronic Materials	5.50	Allin Y. Chao	Watson Pharmaceuticals	5.64
Raymond V. Gilmartin	Merck & Co	6.05	Garry Ridge	WD-40 Co	5.68
Robert F. Spoerry	Mettler-Toledo Intl Inc	5.64	John P. McConnell	Worthington Industries	5.64
Steve Sanghi	Microchip Technology Inc	5.68	Willem P. Roelandts	Xilinx Inc	5.73
Steven R. Appleton	Micron Technology Inc	5.73	Edward Kaplan	Zebra Technologies	6.18

Appendix C—Robustness Analyses

Endogeneity Concerns

Prior research suggests that CEOs may be attracted to or selected by firms whose strategic initiatives are compatible with their own personality (Schneider, 1987; Tang et al., 2018). This possible endogenous relationship between CEO CSE and resource allocation risk taking or strategic nonconformity, or from omitted variables could bias our findings (Aguinis & Edwards, 2014; Semadeni, Withers, & Certo, 2014). To test for potential bias, we conducted a 2-stage least squares (2SLS) analysis. We considered a range of antecedent and contemporaneous variables considered in prior studies of executive psychological characteristics and selected two instruments—founder status and firm age. According to Semadeni et al., (2014), good instrument variables should be related to the focal independent variable and unrelated to the dependent variables. Founders are likely to embody qualities associated with higher levels of CSE such as approach-oriented temperament and a strong positive self-regard. However, founders many not necessarily be more willing to make riskier resource allocation decisions or pursue strategic differentiation, particularly when the firm grows to become a large, publicly traded entity. Younger firms may attract higher CSE CEO because of the opportunity to shape the culture and strategy, but not necessarily be more willing to pursue resource allocation risks or strategic nonconformity. Founder status was positively correlated with CEO CSE (r = .21, p < .001) but not resource allocation risk taking (r = -.03, p = .435) or strategic nonconformity (r = .05, p < .266). Firm age was negatively correlated with CEO CSE (r = -.13, p = .002) but not resource allocation risk taking (r = .04, p = .347) or strategic nonconformity (r = -.05, p < .225).

In the first stage model, we found that the set of instrument variables predicted CEO CSE (F = 4.67, p < .001). In the second stage, we included the control variables, focal study variables

and the residual from the first stage model. For resource allocation risk taking: (a) the CEO CSE by concentration interaction effect was similar to the GEE analyses (coef. = -1.490, p = .001) and the Durbin-Wu-Hausman test (Hausman, 1978) failed to refute the null hypothesis (χ^2 = 0.53, p = .913) indicating that the 2SLS results do not differ significantly from the GEE results; and (b) the CEO CSE by dynamism interaction effect was similar to the GEE analyses (coef. = -3.450, p < .001) and the Durbin-Wu-Hausman test failed to refute the null hypothesis (χ^2 = 0.47, p = .926). Likewise, for strategic nonconformity, the CEO CSE by dynamism interaction effect was similar to the GEE analyses (coef. = -7.739, p = .038) and the Durbin-Wu-Hausman test failed to refute the null hypothesis (χ^2 = 1.69, p = .638). Further, the Hansen-J test was not statistically significance (p > .10) for any of the models indicating that the instruments are exogeneous and not correlated with the residuals of the dependent variables (Semadeni et al., 2014). This set of findings suggests that endogeneity is not a serious threat to the study conclusions.

Sample Selection Concerns

Because we limited our sample to CEOs who remained in office for at least the first three years of the study timeframe and for whom we were able to obtain sufficient narrative and biographical information, sample selection bias may be present in our sample. We conducted an additional set of robustness analyses following recommendations from Certo, Busenbark, Woo, and Semadeni (2016) in using Heckman's (1976) two-stage procedure to correct for the potential effects of sample selection bias. It is recommended that Heckman models include at least one variable—i.e., an exclusion restriction—in the first stage model that does not appear in the second stage model (Certo et al., 2016; Sartori, 2003). Exclusion restrictions should "influence the probability of an observation's appearing in the sample, but do not influence the ultimate dependent variable of interest in the second-stage" (Certo et al., 2016: 2644). We used founder

status as an exclusion restriction as it was not a predictor variable in the second stage and was unrelated to resource allocation risk taking or strategic nonconformity (see above).

We ran a first stage model using founder status to predict the likelihood of a firm-year observation from a population of 532 firms. Founder status positively influenced the probability of appearing in our sample (coef. = 0.569, $p < .001$). We also computed the inverse Mills ratio (lambda) from the first stage model and included the lambda as an additional control in the second stage models. For resource allocation risk taking, we found that the coefficients for the CSE by concentration interaction (coef. = -1.490, $p = .003$) and for the CSE by dynamism interaction (coef. = -3.450, $p = .004$) were significant and similar in magnitude to the estimates from the main study analyses. Likewise, for strategic nonconformity, the CEO CSE by dynamism interaction (coef. = 8.362, $p = .020$) was significant and similar in magnitude to the estimate from the hypothesis test analyses. The results are consistent with the main hypothesis test analyses suggesting that the results are robust to any potential selection bias.

Appendix D—Supplementary Studies

Supplemental Study 1

For supplemental study 1, we collected data from 500 working adults in the U.S using Amazon's Mechanical Turk (MTurk). This service provides researchers access to a large, diverse sample of workers that cross organizational boundaries and job types (Mason & Suri, 2012; Paolacci & Chandler, 2014). When researchers take active steps to identify and remove careless responders, online panel data such as MTurk provide convenient, representative samples demonstrating similar effects as other samples of convenience (Porter, Outlaw, Gale, & Cho, 2019) and measurement equivalence in the assessment of personality between MTurk and non-MTurk samples, particularly when participation is restricted to native English-speaking countries (Behrend, Sharek, Meade, & Wiebe, 2011; Feitosa, Joseph, & Newman, 2015). Following recommendations from Meade and Craig (2012), we excluded 55 respondents (11%) for careless responding (i.e., failing direct attention check items, using single response patterns) yielding a final $N = 445$. Participants were evenly split across gender (52% female) with a mean age of 32.7 years, most holding a full-time job (63%) and a 4-year degree (37%) or some college (28%). Reported job titles included management (e.g., shift manager, store/restaurant manager, assistant director), technical/professional (e.g., analyst, engineer, librarian) and clerical/support (e.g., sales associate, administrative assistant). Participants completed the 11-item adjective-based CSE measure ($\alpha = .84$; Resick et al., 2009), the 12-item Core Self-Evaluation Scale ($\alpha = .89$; CSES; Judge et al., 2003), 6-item measures of approach ($\alpha = .86$) and avoidance motivation ($\alpha = .87$; Johnson & Chang 2008), and the 16-item Narcissistic Personality Inventory ($\alpha = .80$; Ames, Rose, & Anderson, 2006; Raskin & Terry, 1988).

We conducted a confirmatory factor analysis with LISREL 8.8 using maximum

likelihood estimation. The results indicated acceptable fit of a 5-factor model $\chi^2(1214) = 4639.27$, $p < .0001$, CFI = .94, SRMR = .084 and better fit than a one-factor model χ^2 (1224) = 9320.59, $p < .001$, CFI = .89, SRMR = .098, $\Delta\chi^2$ (10) =4681.32, $p < .001$. All items loaded strongly on their respective factor. The adjective-based CSE measure was strongly positively correlated with the established CSE scale ($r = .78$, $p < .001$) providing evidence of convergent validity based on Carlson and Herdman's (2012) assertion that $r > .70$ are recommended to demonstrate convergent validity. The adjective-based CSE measure was also strongly positively correlated with approach motivation ($r = .58$, $p < .001$) and strongly negatively correlated with avoidance motivation ($r = -.61$, $p < .001$). These results support the approach-avoidance profile of CSE. Also, a weak negative correlation was found between CSE and narcissism ($r = -.22$, $p < .001$), indicating the distinctiveness of CSE from inflated self-views associated with narcissism.

Supplemental Study 2

To address limitations regarding the representativeness of the sample for supplemental study 1 and provide further evidence of construct validity, we conducted a second supplemental study with a sample of executives. We worked with the executive education program at a UK-based business school to invite executives who were attending on-campus programming or who were university contacts to complete a brief survey. A total of 44 senior executives of Fortune Global 1000 companies and their subsidiaries were invited to participate of which 34 completed the survey (77% response rate). Participants were predominantly male (88%) with a mean age of 44.1 years and a mean of 14.0 years of executive experience. Titles most commonly held by participants included Chief Operating Officer, Managing Director, and Chief Executive or Deputy Chief Executive. The participating executives completed the same adjective-based measure of CSE ($\alpha = .76$), the CSES ($\alpha = .82$), the approach motivation scale ($\alpha = .64$), and the

avoidance motivation scale ($\alpha = .74$) used in supplemental study 1.

Executives' scores on the adjective-based measure of CSE were strongly correlated with scores on the CSES ($r = .74$, $p < .001$), providing further evidence of convergent validity of the adjective-based CSE measure in an executive population. Scores on the adjective-based CSE measure were also strongly positively correlated with approach motivation ($r = .54$, $p = .001$) and strongly negatively correlated with avoidance motivation ($r = -.50$, $p = .002$), supporting the underlying approach and avoidance temperaments of CSE in an executive population.