

RESEARCH ARTICLE

CEO equity risk bearing and strategic risk taking: The moderating effect of CEO personality

Mirko H. Benischke¹  | Geoffrey P. Martin² | Lotte Glaser³

¹Department of Strategic Management and Entrepreneurship, Erasmus University, Rotterdam School of Management, Rotterdam, The Netherlands

²Department of Business Administration, University of Melbourne, Melbourne Business School, Carlton, Victoria, Australia

³Department of Strategic Management and Entrepreneurship, Erasmus University, Rotterdam School of Management, Rotterdam, The Netherlands

Correspondence

Department of Strategic Management and Entrepreneurship, Erasmus University, Rotterdam School of Management, Burgemeester Oudlaan 50, Rotterdam, NA, The Netherlands.
Email: benischke@rsm.nl

Research Summary: We draw upon applied psychology literature to explore interagent differences in perceived risk to their equity when making strategic risk decisions. Our theory suggests behavioral agency's predicted negative relationship between equity risk bearing and strategic risk taking is contingent upon four personality traits. Our empirical analyses, based on personality profiles of 158 Chief Executive Officers (CEOs) of S&P 1,500 firms in manufacturing industries, indicate the relationship between executive risk bearing and strategic risk taking crosses from negative to positive for high extraversion, greater openness, and low conscientiousness. These findings demonstrate that agency based predictions of CEO risk taking in response to compensation—and board attempts at creating incentive alignment using compensation—are enhanced by integrating insights from personality trait literature.

Managerial Summary: We study the effect of CEO personality on their behavioral responses to stock option pay. Our findings reveal that CEOs that score high on extraversion or openness and low on conscientiousness are less likely to decrease their firm's strategic risk taking as the value of their stock options increases. That is, the tendency of CEOs to become more risk averse in their strategic choices as their option wealth increases (due to loss aversion) is weaker for highly extraverted and more open CEOs, but stronger for more conscientiousness CEOs. Overall, our findings suggest that board of directors need to consider personality traits of their CEOs when designing compensation packages with the intention to align incentives of CEOs with shareholder risk preferences.

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KEYWORDS

behavioral agency model, CEO compensation, CEO personality, strategic risk taking, upper echelons theory

1 | INTRODUCTION

Behavioral agency scholars have devoted considerable effort to examining risk behaviors incentivized by compensation (e.g., Beatty & Zajac, 1994; Devers, McNamara, Wiseman, & Arrfelt, 2008; Larraza-Kintana, Wiseman, Gomez-Mejia, & Welbourne, 2007; Lim, 2015; Martin, Gomez-Mejia, & Wiseman, 2013; Martin, Washburn, Makri, & Gomez-Mejia, 2015; Pepper & Gore, 2015; Wiseman & Gomez-Mejia, 1998). The behavioral agency model (BAM) proposes that executive risk bearing has a negative effect upon the risk they take on behalf of their firm (Wiseman & Gomez-Mejia, 1998). Risk bearing is defined as the perceived wealth-at-risk of loss in the event of failed risk taking; equity risk bearing is the equity wealth component of their firm-specific wealth (Wiseman & Gomez-Mejia, 1998).¹ However, this body of research has featured mixed findings and been largely impotent in recent debates concerning how to structure compensation in the wake of the Great Recession. For instance, different forms of equity risk bearing have been found to have different and sometimes insignificant effects upon agent risk behavior (Devers et al., 2008). These factors have led some to lament that, despite decades of research, we are still unable to predict how executives respond to compensation (Wowak & Hambrick, 2010).

A particularly salient shortcoming within the agency research predicting Chief Executive Officer (CEO) behaviors has been the failure to consider how individual CEOs differ in their responses to compensation arrangements in general and equity compensation in particular (Mannor, Wowak, Bartkus, & Gomez-Mejia, 2016; Wowak & Hambrick, 2010; Wowak, Mannor, & Wowak, 2015). That is, much of the behavioral agency literature is based on the implicit assumption that managerial agents will perceive similar levels of risk to a given amount of equity wealth regardless of individual differences in personality. However, this assumption runs counter to an extensive stream of applied psychology literature demonstrating the importance of considering how different dimensions of personality shape executive decision making, such as through influencing perceived threat, optimism, prescience regarding gain or loss outcomes and comfort with uncertainty (e.g., Bono & Judge, 2004; Boudreau, Boswell, Judge, & Bretz, 2001; Judge & Bono, 2000; Judge, Bono, Ilies, & Gerhardt, 2002; Peterson, Smith, Martorana, & Owens, 2003). Five personality traits have proven instrumental to predicting individual behaviors and the cognitive processes associated with decision making under uncertainty: conscientiousness, neuroticism, agreeableness, extraversion, and openness (McCrae & Costa, 1987). Indeed, the seminal development and subsequent refinements to the five-factor model has received more than 120,000 citations. Given its strong foundation and prominence elsewhere, it is curious that agency research has not leveraged this literature in the context of CEOs' risk response to equity compensation (Wowak & Hambrick, 2010).

¹Subjective estimations of probabilities of loss and the magnitude of loss are taken together to estimate the total wealth-at-risk of loss—or risk bearing of individuals—when making decisions under uncertainty that will affect their wealth (Kahneman & Tversky, 1979). We extend this to include the CEO's strategic decisions that will impact firm share price and hence option wealth.

In this study, we develop a framework that explains how the various personality traits moderate the predicted negative relationship between CEO equity risk bearing and strategic risk taking. The personality trait literature provides the foundation for analyzing how individuals perceive risk. Risk perception is how much risk an individual subjectively estimates is inherent to a decision situation (Sitkin & Pablo, 1992). We draw on this logic to explore the impact of CEO personality on their perception of risk to their equity wealth when making strategic risk decisions on behalf of their firm. To illustrate, in the case of the extraversion/introversion scale, the personality literature argues that extravert CEOs are optimistic, suggesting prospective gain outcomes are likely to be more salient. Greater salience of gains—to firm performance and therefore to CEO equity wealth—leads to a lower risk perception when making strategic risk decisions on behalf of the firm (Sitkin & Weingart, 1995).² This suggests that extravert CEOs will perceive less risk to a given amount of equity wealth; therefore, BAM's predicted negative effect of equity risk bearing on strategic risk taking is likely to be weaker for extravert CEOs.

Using a validated approach to collecting psychometric data that is consistent with prior research (McCrae, Costa, & Busch, 1986; Peterson et al., 2003), we gathered personality profiles on 158 CEOs of S&P 1,500 manufacturing firms to test our theory regarding the moderating effect of personality traits upon CEOs' response to equity incentives. We focus on manufacturing firms given that (a) decisions regarding capital expenditure and R&D are argued to be most critical to creating and maintaining competitive advantage in these industries; and (b) the behavioral agency discourse that we are joining has focused on the same dependent variable and used the same industry subset (e.g., Devers et al., 2008; Martin et al., 2013). We find broad support for our hypotheses.³

Our study offers important theoretical contributions for the governance and behavioral agency literature. First, we advance behavioral agency literature by drawing on the personality literature to offer the insight that CEOs are likely to differ in how they perceive risk, which affects how they respond to equity incentives. In doing so, we advance behavioral agency theory by demonstrating that predictive validity is enhanced by relaxing BAM's implicit assumption of no interagent variation in the perception of risk inherent to a given amount of endowed equity wealth. Indeed, our findings suggest that three personality traits are associated with cross-over interaction effects with CEO equity risk bearing: the relationship between equity risk bearing and risk taking shifts from negative to positive (see Figure 1a–c), underlining the importance of integrating the personality trait with behavioral agency literature. Our study therefore advances behavioral agency theory by suggesting that the aforementioned mixed findings in executive compensation research could be attributed—at least in part—to the omission of the personality trait and applied psychology literatures when predicting executive responses to compensation.

Second, we demonstrate the value added by systematically integrating agency theory and research from applied psychology to more accurately explain CEO strategic risk taking. Third, our findings imply that CEO framing of strategic decision making can be endogenous to the decision maker and specifically, their individual sense making processes, shaped by personality. Taken together, our contributions draw attention to individual differences in CEO responses to their equity wealth; that is, the consequences of equity incentives for incentive alignment may be vastly different across individuals. At a practical level, this means that boards need to consider such individual personality

²The positive correlation between firm performance and the value of CEO equity means that the extraverted CEO will perceive less risk to both the firm and their equity wealth.

³We do not develop theory for the trait of agreeableness given the lack of clear theoretical guidance as to how this personality dimension influences risk propensity and risk perception.

differences when attempting to align incentives of CEOs with shareholder risk preferences through equity grants.

2 | BEHAVIORAL AGENCY THEORY

Agency theory argues that costs are imposed upon shareholders due to separation of managers and owners (shareholders), divergent goals and risk preferences between managers and shareholders, and the difficulty of observing manager behaviors, particularly when ownership is dispersed (Berle & Means, 1932; Jensen & Meckling, 1976). Equity based pay had been proposed as a panacea for the agency problem by ensuring that managers behave as owners, leading to greater effort and less perquisite consumption (Fama, 1980; Jensen & Meckling, 1976). However, the concentration of agent financial and human capital may create additional risk bearing for the agent principal (e.g., Beatty & Zajac, 1994; Holmstrom, 1979), leading to risk profile divergence between the (a) managerial agent, who is assumed risk averse; and (b) shareholder principal who is assumed risk neutral due to their diversified investment portfolio (Eisenhardt, 1989).

BAM changed the way agency scholars conceptualize agent risk preferences by replacing the assumption of agent risk aversion with the empirically grounded concept of loss aversion from prospect theory; loss aversion suggests individuals weigh prospective losses more heavily than gains when making decisions under uncertainty (Kahneman & Tversky, 1979). Thus, managerial agent risk preferences depend upon the CEO's perception of threats to endowed equity wealth, which is wealth the CEO has included in their subjective assessment of personal wealth such as the accumulated value of stock options (Wiseman & Gomez-Mejia, 1998). The endowed wealth equates to prospective losses due to declines in the firm's share price. This linkage of CEO and shareholder wealth leads to the agency problem of risk sharing: sharing the risk of firm performance with both agent and principal (Eisenhardt, 1989). Risk sharing exacerbates agent concentration of wealth in the focal firm, leading the CEO to become increasingly risk averse, driving a wedge between CEO (agent) risk preferences and the risk preferences of shareholders, who are assumed to be risk neutral due to a diversified portfolio (Eisenhardt, 1989; Holmstrom, 1979). The greater the CEO's endowed wealth that bears performance risk (e.g., equity wealth), the less risk the CEO is willing to take, leading to the BAM's prediction that agent risk bearing—such as in the form of firm-specific equity wealth—will be negatively related to risk taking on behalf of the firm.

Importantly, Wiseman and Gomez-Mejia (1998) emphasize the perceptual nature of risk, drawing on the model of Sitkin and Pablo (1992) to highlight the role of perceived risk in influencing risk decisions by executives on behalf of the firm. BAM suggests that risk perception is influenced by the CEO's subjective assessment of the probability that their decision making on behalf of the firm is unsuccessful; the CEO would associate these downside outcomes for the firm with personal losses in their equity wealth, based on the positive correlation between firm performance and the share price (Wiseman & Gomez-Mejia, 1998, p. 137). That is, BAM acknowledges that the risk to agent personal wealth is perceptual and the CEO estimates this risk by assessing the uncertainty of firm level outcomes when making strategic decisions on behalf of the firm.

As we note above, absent from behavioral agency research has been a systematic theoretical explanation as to why managerial agents differ in the risk they perceive to their equity wealth when making strategic decisions on behalf of their firm (Wowak & Hambrick, 2010). Specifically, previous research tends to neglect the role of CEO personality as a contingency that may influence how the CEO perceives risk to accumulated equity wealth when making strategic decisions on behalf of their firm (Wowak et al., 2015; Wowak & Hambrick, 2010). That is, an implicit assumption in behavioral

agency research has been that CEOs will perceive the same level of risk to a given amount of equity wealth—that is, there is no interagent variation in the salience of loss (gain) firm outcomes that could negatively (positively) impact their equity wealth—in the calculus that precedes strategic risk taking, regardless of individual differences in personality. This assumption, however, runs counter to the well-established applied psychology research suggesting that there are differences in individuals' risk perception, depending on the various personality traits (Peterson et al., 2003). Perception equates to a subjective estimation of the probability and magnitude of loss (Johnson & Tversky, 1983) and is shaped by the salience of gain or loss outcomes; greater salience of losses (gains) is associated with higher (lower) risk perception (Sitkin & Weingart, 1995). If perceived risk is a function of personality (Peterson et al., 2003) and risk to the CEO's equity wealth when making strategic decisions is perceptual, it seems logical that BAM would benefit from considering CEO personality when predicting the influence of equity risk bearing upon CEO strategic risk taking.

3 | PERSONALITY AND STRATEGIC RISK TAKING

As noted above, following prior management research on personality traits (Herrmann & Nadkarni, 2014; Nadkarni & Herrmann, 2010; Peterson et al., 2003), we focus on the five-factor model (the “Big Five”) of CEO personality (see Digman, 1990 for an in-depth discussion of the emergence of the five-factor model) to examine the moderating effect of CEO personality on the relationship between CEO risk bearing (associated with equity wealth) and strategic risk taking. Indeed, prior work—mainly grounded in upper echelons theory (Hambrick & Mason, 1984)—has studied the effect of psychological attributes such as confidence levels (Li & Tang, 2010), core self-evaluation (Simsek, Heavey, & Veiga, 2010), narcissism (Chatterjee & Hambrick, 2007, 2011), or job anxiety (Mannor et al., 2016) on organizational decisions and outcomes. Based on the premise that psychological attributes will shape attention, selection and interpretation of environmental stimuli (Hambrick & Mason, 1984), these studies convincingly demonstrate that psychological attributes have a direct effect on CEO decision-making. Yet, while this body of research has created a space within the management literature that considers CEOs psychological attributes as an important antecedent of organizational outcomes, prior research offers limited theoretical and empirical insights into how personality interacts with compensation and specifically equity compensation (Wowak & Hambrick, 2010). Here, we draw on the personality trait literature to assess personality differences across individuals and how they interact with equity wealth to predict strategic risk taking.

We focus on personality trait research from the five-factor model for two reasons. First, recent work by Nadkarni and Herrmann (2010) illustrates the predictive validity of the five-factor model in the context of strategic management, such as when explaining CEO strategic decision making (see also Herrmann & Nadkarni, 2014). They demonstrate that CEO personality is related to strategic flexibility which in turn drives firm performance. Similarly, Peterson et al. (2003) illustrate how CEO personality influences top management team dynamics. More importantly, these studies suggest that the five-factor model may indeed explain individual differences in risk perceptions (see also Malhotra, Reus, Zhu, & Roelofsen, 2018). Second, the five-factor model is strongly established as a pillar of personality psychology research (e.g., Digman, 1990) because it efficiently describes a unique set of personality traits that drives individual's behaviors (Boudreau et al., 2001). We therefore leverage the five-factor model to examine how CEO personality influences CEOs' perception of risk to their firm-specific equity wealth when making strategic risk decisions.

3.1 | Personality traits, risk perception, and strategic risk taking

While technical definitions of risk focus on probability of outcomes, magnitude of outcomes and variance in outcomes (Sanders & Hambrick, 2007), limited cognitive capacity and the human need for simplification means that it is unlikely decision makers consider all three dimensions of risk in a rational manner (Weber & Milliman, 1997). Instead, the decision making process is simplified by cognitive heuristics that efficiently estimate risk inherent to a situation (or the perceived risk), thereby making selective use of available data (Hambrick & Mason, 1984; Weber & Milliman, 1997). For example, heuristics are used to assess the odds of failure or success when estimating risk (Kahneman & Lovallo, 1993). Risk perception is therefore shaped by these subjective judgments, along with an individual's interpretation of more formal modelling (bounded by cognitive constraints). Drawing on these insights, the related concepts of bounded rationality and heuristics have been central to behavioral research examining how decision makers perceive risk when making choices (Sitkin & Pablo, 1992; Sitkin & Weingart, 1995; Wiseman & Gomez-Mejia, 1998).

In their model of individual risk behavior, Sitkin and Pablo (1992) develop the role of risk perception in predicting risk taking by describing how risk perception is shaped by the salience of loss or gain outcomes. If individuals are focused more upon the prospect of loss outcomes, the subjective estimate of the probability of the loss event becomes higher, meaning they perceive higher risk (Sitkin & Weingart, 1995). Conversely, if individuals are more prescient with regard to gain outcomes, those upside possibilities become more salient in the decision making process; hence, the decision maker perceives lower risk due to salience of gain outcomes (March & Shapira, 1987). In sum, in any given decision situation, high salience of loss outcomes equates to high perceived risk and greater salience of gain outcomes equates to lower perceived risk.

We noted above BAM's prediction that CEOs are expected to take less risk as their equity risk bearing increases, due to aversion to losses in that wealth if risk taking on behalf of their firm is unsuccessful (Wiseman & Gomez-Mejia, 1998). This proposition is based on the insight that higher perceived risk of firm level losses equates to higher perceived risk of equity wealth loss. This draws on logic that has provided the foundation for the literature exploring the agency problem: CEOs bear performance risk (personal exposure to firm performance declines) due to equity based pay, resulting in divergence in risk profiles of CEO and shareholders. Using this logic, BAM argues that the performance risk borne by the CEO is proportionate to their equity wealth and weighs on the CEO when making strategic decisions. Yet, as also noted above, BAM does not consider that the perception of risk inherent to a given amount of endowed equity wealth may differ across agents. Relaxing this assumption, we therefore argue below that salience of firm level loss outcomes to the CEO will be a function of their personality traits. Greater salience of losses leads to higher perceived risk of (a) firm share price decline when making strategic risk decisions on behalf of their firm, and as a result (b) equity wealth loss due to those share price declines.

3.1.1 | Conscientiousness, risk perception, and strategic risk taking

Conscientiousness describes two important aspects of personality: achievement orientation and dependability (Judge & Bono, 2000). Conscientious individuals are seen as dependable, following established rules and obeying norms, making them reliable and responsible (Costa & MacCrae, 1992; Fong & Tosi, 2007). They prefer being in control (Judge & Bono, 2000). The more uncertain the outcomes associated with any decision, the more vulnerable one becomes to external events and to the effort of others, which does not sit comfortably with conscientious individuals (Miller & Toulouse, 1986). It follows that potential loss outcomes are likely to weigh heavily upon conscientious individuals (Peterson et al., 2003), which in turn makes loss outcomes more salient. That is, while loss

outcomes are weighed more heavily than gains across all individuals (according to the logic of loss aversion), loss outcomes are likely to be more salient for more conscientious individuals.

Given the association between conscientiousness and greater salience of loss outcomes argued above, we posit that more conscientious CEOs are likely to perceive higher risk of firm performance declines in the strategic decisions they make on behalf of their firm. We expect this higher CEO risk perception at the firm level translates into higher perceived risk to equity wealth-at-risk (equity risk bearing) given that this wealth's value fluctuates with the firm's share price. We therefore argue that increases in CEO equity wealth evoke a stronger behavioral response for conscientious CEOs due to the greater salience of loss outcomes and hence higher perceived risk to a given level of equity wealth (relative to less conscientious CEOs). Said differently, the decision biases associated with loss aversion—the tendency to avoid losses in accumulated wealth and frame risk taking as a threat to that wealth—are likely to be accentuated when the CEO is more conscientious due to higher perceived risk of personal wealth loss. This leads to our formal prediction:

Hypothesis 1: *CEO conscientiousness accentuates the negative effect of equity risk bearing on strategic risk taking.*

3.1.2 | Neuroticism, risk perception and strategic risk taking

Neuroticism reflects the adaptability of individuals to different situational demands; more neurotic individuals are also described as less emotionally stable and less adaptable, meaning they are less likely to remain calm when having to adapt to new situations (McCrae & Costa, 1997). Neuroticism is considered a multi-dimensional construct consisting of factors such as pessimism, worry and self-doubt (Scheier, Carver, & Bridges, 1994). Pessimism and worry are associated with pre-occupation with downside outcomes, as the individual obsesses over what could go wrong (Carver, 1989). Said differently, the salience of loss outcomes is likely to be greater for neurotic individuals (Hemenover, 2001); given salience of loss equates to higher risk perception, neurotic individuals are likely to perceive higher risk in any given decision (e.g., Herrmann & Nadkarni, 2014; Nadkarni & Herrmann, 2010).

Building on the above logic, we argue that neuroticism is likely to lead to higher perceived risk to equity wealth when a CEO is making strategic decisions with uncertain payoffs. In other words, neuroticism is likely to accentuate cognitive tendencies to focus on loss outcomes in the calculus associated with risk taking. It follows that neurotic CEOs are more likely to perceive greater firm risk and therefore a greater threat to a given amount of equity wealth-at-risk (equity risk bearing) when making decisions on behalf of the firm. Therefore, increases in equity wealth-at-risk (equity risk bearing) are more likely to result in a further reduction of strategic risk taking when the CEO is more neurotic, as decisions to take additional risk on behalf of their firm are more likely to be framed as an unnecessary threat to their wealth. This equates to our predicted accentuation effect of CEO neuroticism upon the negative relationship between CEO equity risk bearing and strategic risk taking:

Hypothesis 2: *CEO neuroticism accentuates the negative effect of equity risk bearing on strategic risk taking.*

3.1.3 | Extraversion, risk perception and strategic risk taking

Extraversion is grounded in the work by Eysenck (1973) who broadly conceptualize this personality dimension as a need for stimulation. Following this definition, Hogan (1986) suggests that extraversion captures individuals' ambition (reflected in traits such as surgency, excitement seeking, or assertiveness) and sociability (related to traits such as sociable, fun-loving, affectionate, friendly, or

talkative). Extraverts tend to be optimistic and seek adventure (Judge & Cable, 1997). The same way that pessimism above is described as increasing the salience of loss outcomes, optimism associated with extraversion creates a pre-occupation with the upside outcomes, making the gain outcomes more salient. Given gain outcomes are more salient for extraverted individuals, they are likely to perceive lower risk. This, for example, is reflected by their propensity to pursue strategies that are considered to be particularly challenging (Bono & Judge, 2004; Malhotra et al., 2018). Similarly, extravert CEOs show greater willingness to challenge the status quo and are thus more likely to initiate strategic change (Herrmann & Nadkarni, 2014). It follows that extraverted individuals exhibit a bias toward focusing on firm level wins and associated personal equity gains they could reap if things go well, meaning that success—rather than failure—is more salient in their decision making (Hemenover, 2001). Therefore, with their attention directed toward successful strategic risk taking, the extravert CEO is likely to perceive less risk of failure when making decisions on behalf of the firm; this equates to less perceived threat to their equity wealth. Said differently, greater salience of gain outcomes is associated with lower perceived risk to a given amount of equity wealth when making strategic decisions that will impact the value of that wealth.

In sum, we argue that increases in equity wealth will evoke a weaker behavioral response for extravert CEOs, meaning that extravert CEOs are less likely to respond to increases in equity wealth-at-risk (equity risk bearing) by reducing strategic risk taking to preserve their equity wealth (relative to introvert CEOs). Hence:

Hypothesis 3: *CEO extraversion attenuates the negative effect of equity risk bearing on strategic risk taking.*

3.1.4 | Openness, risk perception and strategic risk taking

Individuals that score high on openness to experience are best characterized as “original, imaginative, having broad interests, and daring” (McCrae & Costa, 1987, p. 87; see also McCrae, 1987). Open leaders are more receptive to new experiences such as new feelings, thoughts, perspectives, and ideas (George & Zhou, 2001). Therefore, open leaders actively seek creative solutions to problems and show greater willingness to challenge the status quo (Nadkarni & Herrmann, 2010). Similarly, open CEOs tend to adopt leadership styles that encourage followers to question old assumptions, thereby facilitating divergent thinking and the expression of new ideas and new perspectives (Judge & Bono, 2000). To ensure that new ideas and perspectives are actively considered, it is necessary to sell “what could be,” or positive outcomes, to open the minds of colleagues or investors. For example, open CEOs are more likely to see a vision for their company and are also able to sell this internally (Bono & Judge, 2004), meaning that the positive outcomes that they are trying to sell are likely to become more vivid in their own decision making processes. This suggests that openness to a diverse set of ideas may translate into greater prescience with regard to the upside of strategic decisions (Lauriola & Levin, 2001); hence, gain outcomes are more salient for more open individuals and the perceived risk in any decision is likely to be lower.

In sum, strategic risk taking will be perceived as creating less risk to a given amount of equity wealth when CEOs are higher on the openness scale (relative to less open CEOs), making them less likely to reduce firm strategic risk as their equity risk bearing increases:

Hypothesis 4: *CEO openness to experience attenuates the negative effect of equity risk bearing on strategic risk taking.*

3.1.5 | Agreeableness, risk perception, and strategic risk taking

Agreeable individuals are trusting, kind and cooperative; they tend to avoid conflict and value relationships (Costa and McCrae, 1992). Prior research has found this to be the most complex of the five traits when predicting CEO behaviors (Nadkarni & Herrmann, 2010). This will be, at least in part, because it is difficult to predict how an agreeable CEO will behave without examining the preferences of those around the CEO. But it is also because the personality trait literature does not give clear theoretical guidance regarding CEO risk perception of agreeable individuals. Hence, we do not develop a hypothesis for this personality trait.

4 | METHODOLOGY

4.1 | Sample and data sources

Our sample consists of CEOs of S&P 1,500 firms who were appointed in the years 2004 and 2005. This approach has allowed us to gather a representative, but manageable sample and our approach is broadly consistent with that used by Chin, Hambrick, and Trevino (2013). Following the collapse of the “dot-com bubble” between 1999 and 2002, there was significant economic turmoil affecting not only internet companies but also noninternet firms. In order to avoid the possibility that CEO appointments were confounded by the effects of the dot-com bubble, we focus on the years 2004 and 2005 during which the stock markets and wider economy had already stabilized. For instance, Goldfarb, Kirsch, and Miller (2007) report that most bankruptcies associated with the collapse of the dot-com bubble took place before 2004. Moreover, popular video-sharing platforms such as YouTube were founded around that time allowing us to also include video clips in our coding process (Petrenko, Aime, Ridge, & Hill, 2016).

We applied three additional sampling filters. First, consistent with prior behavioral agency studies (e.g., Devers et al., 2008; Martin et al., 2013), we have limited our sample to CEOs in manufacturing industries (two digit SIC code 20–39) given the industry-specificity of our strategic risk taking measure. The logic behind this is that capital expenditure and R&D are more likely to be larger and critical to the success of manufacturing firms given they have a larger proportion of total assets invested in property, plant and equipment; this suggests R&D that innovates manufacturing processes and capital expenditure that is necessary to house and produce products are more likely to attract the attention of the CEOs of manufacturing firms (Devers et al., 2008; Martin et al., 2013). Moreover, based on the two-digit SIC code, manufacturing firms constituted the largest group of firms in the S&P 1500 in 2005 (638 firms), followed by finance (235 firms) and services (218 firms). Second, we excluded five interim CEOs that served for less than two fiscal years. This was important as we were interested in observing the effect of CEO personality on strategic risk taking over time (Ballinger & Marcel, 2010). Third, for similar reasons we also excluded Antonio Alvarez who was appointed CEO of Interstate Bakeries in September 2004 as “turnaround consultant.” Turnaround consultants are often brought in for relatively a short period of time and our theory may thus not apply to such special cases. After applying these criteria, our sample is comprised of 158 individual CEOs that were appointed in 2004 or 2005.

Most CEOs in our sample were appointed to firms in the “Electronic and Other Electrical Equipment and Components” (41 firms) industry, followed by “Industrial and Commercial Machinery and Computer Equipment” (26 firms), and “Chemicals and Allied Products” (21 firms). Additional t-tests showed that the firms included in our sample are not significantly different from the remaining S&P 1500 manufacturing firms in terms of total assets ($p = 0.688$; rejecting the null that the means are

equal), revenue ($p = 0.916$), as well as number of employees ($p = 0.379$). In our sample, we included observations up to 2012. Thus, if a CEO was appointed in 2004 and remained in office until 2012, we would have 9 years of observation for that CEO. After excluding cases with missing data, our approach yielded a pooled time series of 935 firm-year observations.

The measurement of the independent variables—the personality traits—presents a major challenge. Although preferred, directly measuring CEO personality—for instance through a survey instrument—is difficult as CEOs of large publicly listed firms are often unwilling to complete comprehensive psychometric surveys (Hambrick, 2007). In addition to the fact that such surveys are time-consuming, complete information about CEO's personality profiles is also very sensitive as the results of such psychometric surveys may jeopardize the CEO's career. While some have succeeded in collecting primary data (e.g., Herrmann & Nadkarni, 2014; Nadkarni & Herrmann, 2010), these studies have focused on relatively small firms located in emerging economies. In contrast, we focus on CEOs of S&P 1,500 manufacturing firms, meaning that obtaining comprehensive first-hand information about CEOs personality profiles is deemed infeasible (Chatterjee & Hambrick, 2007, 2011; Wowak, Mannor, Arrfelt, & McNamara, 2016). Instead, we follow prior research (e.g., Chatterjee & Hambrick, 2007, 2011; Peterson et al., 2003; Petrenko et al., 2016; Wowak et al., 2016) and adopt an unobtrusive approach to measure CEO personality.

Specifically, we closely follow the historiometric technique used by Peterson et al. (2003) to measure the personality traits (this approach has also been used in other disciplines such as political economy; see for example Hermann, 1976, 1980). As a first step, we compiled dossiers containing all information we could find about the CEO. We only include information that we can directly attribute to the CEO; that is, we exclude information from secondary sources such as comments relating to the CEO's personality made by third parties. We used multiple independent archival data sources to obtain information about each CEO. For instance, we include biographic information about each CEO, interviews with the CEO, newspaper articles containing direct quotes of the CEO, transcripts of unscripted question and answer sessions that are part of conference calls with analysts and investor conferences, and writings that can be directly attributed to the CEO such as articles, memos, and emails. If available, we further include video samples showing the CEO giving public speeches, lectures at universities, or interviews. To identify this information, we performed systematic Google searches using the name of the CEO as keyword as well as additional searches using Lexis/Nexis. This approach resulted in extensive dossiers—in each dossier we included a minimum of 15 pages and video samples if available—about each CEOs included in our study. Specifically, the average dossier consisted of one document with biographic information, three videos, three interviews, 25 conference calls, one writing that can be attributed to the CEO, and one newspaper article including quotes from the CEO.⁴ In the second step, we trained three coders that subsequently used the California Adult Q-Set (CAQ; Block, 1978) to describe the personality of each CEO based on the dossiers we had prepared. These techniques allowed us to obtain personality data on 158 CEOs.

4.2 | Dependent variable

4.2.1 | Strategic risk taking

In order to ensure consistency with prior behavioral agency research examining CEO strategic risk taking (e.g., Devers et al., 2008; Martin et al., 2013) we adopt a measure of *strategic risk taking* using long-term debt, R&D spending and capital expenditures from Compustat. Long-term debt was measured taking the debt with maturity beyond 1 year held on each firm's balance sheet. R&D spending

⁴The dossiers are available upon request from the first author.

was measured by the annual expenditure in a given year and capital expenditure is the firm's spending on plant, equipment and property. We factor-analyzed the three measures and found that all of them loaded above 0.80. All variables loaded on a single factor having an eigenvalue of 2.3 and accounting for 76% of the variance suggesting that these measures can be grouped into a composite indicator of strategic risk taking. Consequently, for each CEO, we calculated the sum of the three expenditures into a single variable. This variable is positively related to CEO strategic risk taking on behalf of the firm (Devers et al., 2008; Martin et al., 2013).

4.3 | Independent variables

4.3.1 | CEO equity risk bearing

Consistent with prior behavioral agency research (e.g., Larraza-Kintana et al., 2007; Martin et al., 2013; Wowak et al., 2015), we focus on stock options to capture CEO equity wealth that creates risk bearing. This is justified by both the ubiquity of CEO stock option pay and the high-powered incentives associated with stock options (Gomez-Mejia, Neacsu, & Martin, 2017; Jensen, 2005). CEO *equity risk bearing* was calculated using the combined value of exercisable and unexercisable stock options, where we take the number of options from each option grant and multiply it by their corresponding spread (for in-the-money options) on the last day of each their firm's fiscal year in $t - 1$. Data on stock options was collected from Execucomp.

4.4 | Moderating variables

4.4.1 | CEO personality

As noted above, we measured CEO personality using the CAQ. Following Peterson et al. (2003), we used the CAQ developed by Block (1978). The CAQ is a 100-item extensively validated and used instrument to make comprehensive assessments of individual five factor personality (for a detailed list of the 100-items included in the CAQ see Block, 1978: 8–12). Indirect methods to measure personality such as the CAQ have been extensively used in the field of psychology (e.g., Peterson et al., 2003) and other disciplines such as political economy (e.g., Hermann, 1976, 1980) to evaluate the personality of individuals based on archival data (for an overview of historiometric techniques used to quantify leaders' character traits see Ligon, Harris, & Hunter, 2012). Prior studies have also validated the CAQ as it has been applied to the five-factor model (McCrae & Costa, 1987). The CAQ includes items such as “Behaves ethically” (*conscientiousness*), “Is critical, sceptical, not easy to impress” (*neuroticism*), “Behaves assertively” (*extraversion*), and “Has a wide range of interests” (*openness*). In total, we used three independent raters during the data collection process. For each CEO, we assigned two of those raters to complete the CAQ. Each coder was a postgraduate student in clinical psychology with extensive background knowledge on personality research. We repeatedly instructed the two coders assigned to the same dossier not to communicate with each other about the sorting process to ensure that the sorts were completed independently. Since all coders had a background in clinical psychology, it was also unlikely that they had in-depth knowledge about neither the CEOs in our sample nor the companies. However, we also repeatedly instructed the coders to only base their sorts on the information included in the CEO dossiers and not on information outside these packages.

Before aggregating the CAQ ratings from the two coders assigned to the same dossier to form a composite measure, we conducted several analyses to ensure our data exhibited sufficient reliability, consistency, and agreement (Bliese, 2000). First, we calculated the average interrater correlation between the two raters, the intraclass correlation coefficient 1 (ICC1) and 2 (ICC2) (Bliese, 2000;

Shrout & Fleiss, 1979) to assess whether it met the statistical criteria for aggregating individual responses from each CEO. ICC(1) assumes random selection of raters and equal numbers of individual raters (Glick, 1985) and represents the reliability associated with single assessment of the group mean of ratings (Peterson et al., 2003). ICC(2) is a measure of the reliability of the group means on an aggregate variable; in the present case the reliability of the mean of the raters. The average ICC (1) and the average ICC(2) were 0.61 and 0.76, respectively. Second, we calculated an interrater agreement score (r_{wg} ; LeBreton & Senter, 2008) as it represents a comparison of the variance in judges' ratings of a CEO's personality to an expected variance based on random responses. The interrater reliability is Cohen's Kappa, which ranges from 0 to 1 (although negative numbers are possible), where larger numbers mean better reliability. We assumed a uniform distribution of ratings to generate the expected variance. For the CAQ, the average interrater correlation was 0.68, based upon 316 comparisons (158 CEOs). Most researchers prefer Kappa values to be at least 0.60 before claiming a good level of agreement (Glick, 1985). Together, these analyses supported our decision for aggregating ratings across the two raters and creating the mean rating of each CEO. To obtain scores on the personality traits, we followed Peterson et al. (2003) and computed factor scores for each personality dimension using the factor loadings for the CAQ reported by McCrae et al. (1986). We subsequently rescaled all scores to a 9-point scale. The composite ratings for each CEO included in our sample are available upon request.

4.5 | Control variables

We controlled for possible alternative explanations by including a number of control variables. At the CEO level, we controlled for *gender* by including a dummy variable taking the value of 1 if the CEO was female, and 0 if otherwise. We also included CEO *tenure* (in months) as a control variable as prior work experiences may indicate differences in knowledge and abilities that influence risk taking (Wiersema & Bantel, 1992). In line with this reasoning, the same logic may also apply to CEO age. Therefore, we controlled for CEO *age* in years. We also controlled for CEO *duality* which is positively related to the CEO's influence upon firm behaviors (Lim, 2015). CEO duality was coded as a binary variable, taking the value of 1 if the CEO also held a position of board chairperson, and 0 if otherwise.

To control for other types of compensation we include measures of CEO *restricted stock*, *prospective wealth* and *cash*. Restricted stock was measured as the aggregate market value of restricted stock held by the CEO at fiscal year-end in $t - 1$. Prospective wealth is the potential additional wealth that a CEO estimates could be realized in the event of successful risk taking (Martin et al., 2013). Consistent with prior research (Gomez-Mejia et al., 2017; Martin et al., 2013, 2015), prospective wealth is calculated as: Prospective wealth = Number of Options Held \times [(1.068^{time} \times Stock Price) - Stock Price]. Cash is the value of cash compensation (bonus and cash pay) the CEO has received in year $t - 1$.

At the firm level we controlled for three important variables. First, we controlled for *firm size* as prior research has shown that this might affect risk taking. Firm size was measured by using the natural logarithm of total assets in each firm to reduce skewness (Audia & Greve, 2006). Second, we controlled for *free cash flow* to account for project inefficiencies. Free cash flow is measured as follows (Iyer & Miller, 2008): (EBITDA - CapEx - (Working capital $t - 1$ - Working capital $t - 2$)/Total assets). Third we controlled for *firm performance*. Firm performance was measured using a proxy for Tobin's q (Chung & Pruitt, 1994). We measured the firm-level control variables at time $t - 1$. Lastly, we included *year dummies* to control for differences in strategic risk taking across time with 2012

being the reference category. Similarly, we also include *industry* dummies to control for unobserved differences across manufacturing industries.

4.6 | Estimation and procedures

To evaluate whether the interplay between and equity risk bearing would influence strategic risk taking, we examined the trait data using generalized linear models (GLM). GLM models are mathematical extensions of linear models that do not force data into unnatural scales, and thereby allow for nonlinearity and nonconstant variance structures in the data (Hastie & Tibshirani, 1990). Because the data in our sample are pooled time series, where firm-year represents the observation, GLM was appropriate as it allows us to specify any degree of interaction effects. Moreover, GLM has the advantage to obtain robust standard errors that are corrected for over dispersion (McCullagh, 1984). Thus, GLM is more flexible and better suited for analyzing time series data (McCullagh & Nelder, 1989). We ran our GLM models using a Gaussian (normal) distribution with an identity link function. Since we included time invariant variables in the models (such as our personality scores), we did not use a fixed-effect models. Instead, we used a random-effects model which is most appropriate when including time-invariant variables. For all regressions in our model we used robust variance estimators (White, 1980). Finally, we calculated *z*-scored for all variables, except for strategic risk taking, before calculating the interaction variables (Aiken & West, 1991).

5 | RESULTS

Table 1 summarizes our hypotheses and their empirical support. Table 2 presents the descriptive statistics for the variables included in our study. Consistent with prior research (Herrmann & Nadkarni, 2014), there was a high correlation between conscientiousness and extraversion, and conscientiousness and openness. Additional post-regression diagnostics showed that the VIF scores remain well below the commonly accepted threshold of 10 (Cohen, Cohen, West, & Aiken, 2003). Thus, we multicollinearity appears not to be an issue in our study.

Table 3 presents the results. Model 1 contains the control variables. Models 2–5 include CEO equity risk bearing variable—i.e., CEO risk bearing associated with stock options—and the personality traits as moderators of the former relationship. Model 6 includes all interactions. All models were highly significant according to the Wald χ^2 test.

Hypothesis 1 suggests that CEO conscientiousness accentuates the negative effect of CEO equity risk bearing on strategic risk taking. In Model 2b, the interactive effect of conscientiousness and equity risk bearing is significant and negative ($\gamma = -0.07$, $SE = 0.03$, [95% confidence interval: $(-0.014, -0.008)$], $p = 0.04$), indicating that the relation between equity risk bearing and strategic risk taking becomes weaker when a CEO's conscientiousness is low than when it is high. In practical terms, for each one standard deviation increase in conscientiousness, CEO strategic risk taking in response to equity risk bearing decreases by a further 41%. For CEOs with high conscientiousness (one *SD* above the mean) the effect of equity risk bearing on their strategic risk taking becomes weaker, whereas for CEOs that have low conscientiousness (one *SD* below the mean) the relationship is positive (see Figure 1a). These results provide support for Hypothesis 1.

Next, we tested Hypothesis 2 predicting that CEO neuroticism accentuates the negative effect of equity risk bearing on strategic risk taking. As shown in Model 3b, while we did find a direct negative effect of neuroticism on strategic risk taking ($\gamma = -0.68$, $p = 0.03$), the interactive effect of

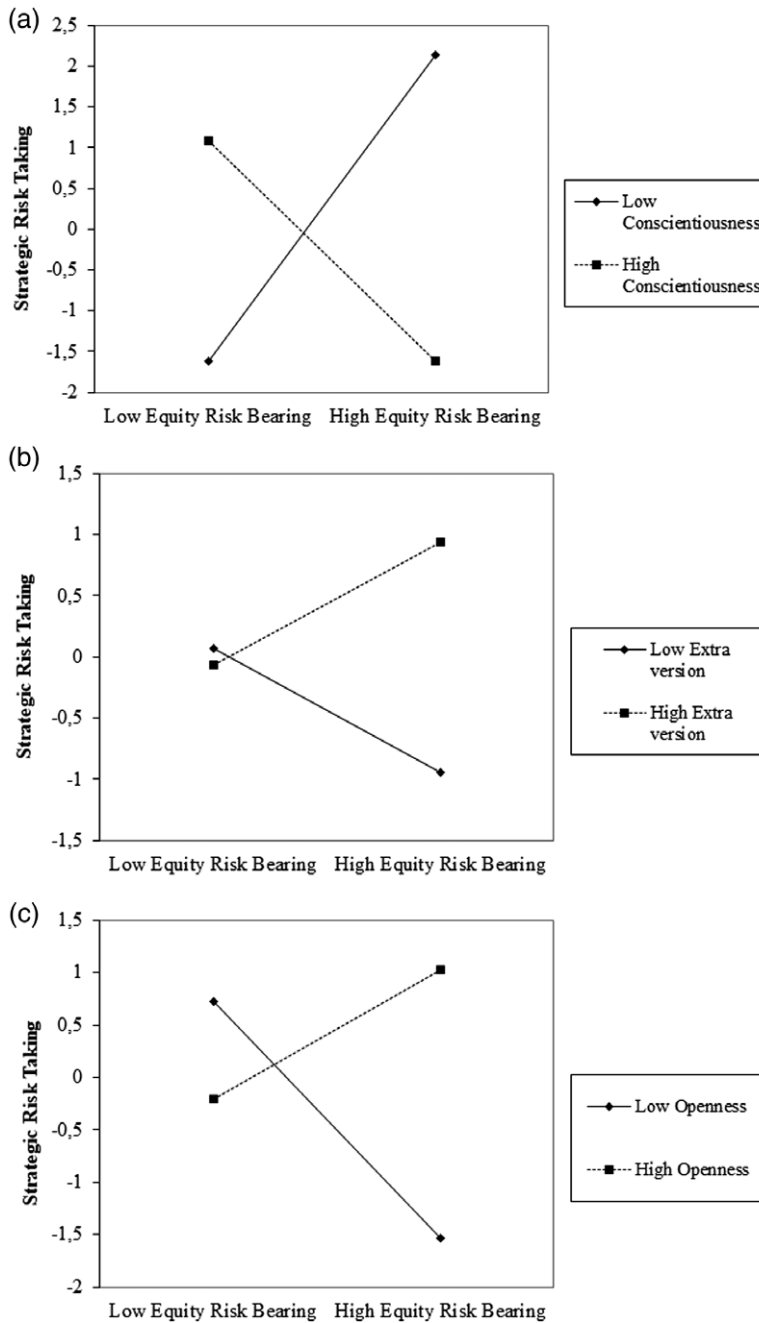


FIGURE 1 (a) Interaction effect of Chief Executive Officer (CEO) conscientiousness on the relationship between equity risk bearing and strategic risk taking. (b) Interaction effect of CEO extraversion on the relationship between equity risk bearing and strategic risk taking. (c) Interaction effect of CEO openness on the relationship between equity risk bearing and strategic risk taking. *Notes.* (a) Low conscientiousness is one standard deviation below the mean and high conscientiousness is one standard deviation above the mean. (b) Low extraversion is one standard deviation below the mean and high extraversion is one standard deviation above the mean. (c) Low openness is one standard deviation below the mean and high openness is one standard deviation above the mean

equity risk bearing and neuroticism was negative but nonsignificant ($\gamma = -0.03$, $p = 0.41$), rejecting Hypothesis 2. We address this in the Discussion.

According to Hypothesis 3, CEO extraversion attenuates the negative effect of CEO equity risk bearing on strategic risk taking. As shown in Model 4b, the interactive effect of stock and extraversion is positive and significant ($\gamma = 0.05$, $SE = 0.01$, [95% confidence interval: (0.028–0.067)], $p = 0.00$), indicating that the negative relationship between CEO equity risk bearing and strategic risk taking becomes weaker when CEOs are more extraverted (see Figure 1b). For one standard deviation increase in extraversion, CEO strategic risk taking in response to equity risk bearing increases by an additional 25%. Hence, Hypothesis 3 is supported.

Lastly, we tested whether CEO openness to experience attenuates the negative effect of CEO equity risk bearing on risk taking. We found support for Hypothesis 4 as the interactive effect of CEO wealth associated with equity risk bearing and openness was positive and significant (Model 5b; $\gamma = 0.11$, $SE = 0.02$, [95% confidence interval: (–0.013–0.002)], $p = 0.00$). CEOs with that score high on openness, the effect of equity risk bearing on strategic risk taking becomes much stronger, whereas for CEOs that have low scores on openness, the relation is negative (see Figure 1c). Thus, for one standard deviation increase in openness, CEO strategic risk taking in response to equity risk bearing increases by a further 32%. We therefore conclude that CEO openness does indeed attenuate the CEO's response to their equity risk bearing.

5.1 | Robustness tests and endogeneity

We performed several supplementary analyses to examine the robustness of the findings with a focus on issues broadly related to endogeneity concerns. Most importantly, we control for endogeneity of CEO equity wealth, given the possibility that strategic risk itself may be an antecedent of these compensation measures (Martin et al., 2013). Withers, Certo, and Semadeni (2014) provide evidence showing endogeneity does not systematically bias estimates of interaction coefficients; yet, caution that models that include interaction terms should control for endogeneity of the main effect of endogenous variable that is interacted (i.e., CEO equity wealth). We performed 2SLS regressions for each of our models using several instrumental variables for CEO equity wealth, such as number of shares owned ($t - 2$), the number of unexercised exercisable options ($t - 2$), number of restricted stock holdings ($t - 2$), number of unexercised unexercisable options ($t - 2$), and value of restricted stock holdings ($t - 2$). Results remained robust to the endogeneity control. The instruments were found to be exogenous and valid as the Sargan's J -test of over-identifying restrictions fails to reject the null hypothesis ($p = 0.28$) (Semadeni, Withers, & Certo, 2014). Moreover, the F -statistic in our first stage model was also significant ($p = 0.00$).

As another robustness check, we also conducted the same set of analysis without any control variables in order to probe the influence of contextual variables (Glaser, Stam, & Takeuchi, 2016). Running analysis with and without control variables is important because it allows us to better understand the impact of the control variables on the relationship between our explanatory variables and the dependent variable (Glaser et al., 2016). Said differently, running analysis without control variables offers important information about the utility of our explanatory variables to explain uncontrolled variance in the dependent variable (see Becker et al., 2016 for a discussion; see also Breaugh, 2006). Our results were unaffected by exclusion of any of these control variables, providing support for the validity of our findings.

TABLE 1 Moderating effect of personality traits upon relationship between equity risk bearing and strategic risk taking

	Theoretical logic	Predicted moderation effect	Supported
Conscientiousness	Increases perceived risk to firm performance and equity wealth	Accentuation	Yes
Neuroticism	Increases perceived risk to firm performance and equity wealth	Accentuation	No
Extraversion	Decreases perceived risk to firm performance and equity wealth	Attenuation	Yes
Openness	Decreases perceived risk to firm performance and equity wealth	Attenuation	Yes
Agreeableness	No clear indication of how moderation will work and hence we do not hypothesize	N/A	N/A

6 | DISCUSSION AND CONCLUSION

The objective of this study has been to examine the role of personality in shaping CEO strategic risk taking in response to equity risk bearing. We have done so by examining how conscientiousness, neuroticism, extraversion, and openness moderate the relationship between CEO equity risk bearing and strategic risk taking. We have found that CEO conscientiousness accentuates the negative relationship between equity risk bearing and strategic risk taking, while extraversion and openness neutralize reductions in strategic risk taking in response to equity risk bearing. We believe that our findings have important implications for theory and practice.

6.1 | Theoretical implications

Behavioral agency research examining principal-agent incentive alignment has demonstrated that CEO strategic risk taking is influenced by various compensation related measures of risk bearing, such as the accumulated value of stock options (e.g., Devers et al., 2008; Larraza-Kintana et al., 2007; Martin et al., 2013). Central to the majority of this research has been a prediction that the CEO will take less risk as their risk bearing—including equity risk bearing—increases. However, our findings suggest that each individual will make sense of the risk to their equity wealth in different ways, contingent on their various personality traits. By doing so, our study addresses the simplifying assumption inherent to BAM that there are no individual differences in the evaluation of risk to endowed equity wealth in any given situation. Specifically, we demonstrate that CEOs differ in how they respond to risk bearing, contingent upon personality. This suggests that risk perception—or the extent to which the CEO perceives that risk taking on behalf of their firm threatens their equity wealth—is shaped by their personality; this in turn explains heterogeneous responses to equity risk bearing. As such, given the demonstrated importance of understanding personality when predicting response to compensation, our study therefore offers an avenue for enhancing the predictive validity of a theory that has been criticized for its inability to predict managerial agent (CEO) risk behavior (Wowak & Hambrick, 2010).

Eisenhardt's (1989) seminal review of agency theory long ago advised that agency theory and understanding of the links between incentives (such as equity incentives) and firm behaviors will be advanced by integrating its predictions with other theoretical perspectives. This advice has largely gone unheeded, limiting the progress of agency theory (Boyd & Solarino, 2016). In integrating the five-factor model from applied psychology our framework highlights the importance of the most ubiquitous predictor of human behavior (personality traits; Peterson et al., 2003) when considering the effectiveness of equity pay as a mechanism for aligning the risk preferences of managerial agents with those of principals-shareholders. Indeed, the significance of personality in the relationship between CEO equity risk bearing and strategic risk taking is underlined by Figure 1a–c, graphically

TABLE 2 Descriptive statistics and correlations

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. CEO gender	0.02	0.14															
2. CEO tenure	23.17	2.56	0.03														
3. CEO age	54.45	6.16	-0.04	0.13**													
4. CEO duality	0.47	0.50	-0.01	0.25**	0.15**												
5. CEO cash compensation ^a	1.27	1.49	0.07*	0.57**	0.03	0.22**											
6. CEO prospective wealth ^a	17.82	29.87	-0.03	0.08*	0.01	0.17**	0.00										
7. CEO restricted stock ^a	2.57	4.47	-0.01	0.14**	0.03	0.23**	0.22**	0.26**									
8. CEO equity risk bearing ^a	6.10	12.98	-0.06	0.10**	-0.05	0.12**	0.15**	0.64**	0.15**								
9. Firm free cash flow	0.04	0.12	0.00	0.01	-0.08*	0.08*	0.05	0.07*	0.00	0.09**							
10. Firm size ^b	3.34	0.65	0.12**	0.09**	0.02	0.37**	0.40**	0.45**	0.35**	0.29**	0.18**						
11. Firm performance	0.84	1.11	0.02	0.42**	0.01	0.11**	0.20**	0.15**	-0.07*	0.28**	0.06	-0.02					
12. Conscientiousness	4.74	1.78	0.06	0.58**	0.03	0.18**	0.26**	0.09**	0.04	0.16**	0.02	0.08*	0.76**				
13. Neuroticism	3.25	0.35	0.01	-0.09**	0.02	-0.10**	-0.12**	-0.13**	-0.11**	-0.07*	0.05	-0.13**	0.10**	-0.10**			
14. Extraversion	5.72	0.78	0.05	0.55**	-0.02	0.21**	0.31**	0.14**	0.08*	0.14**	0.02	0.15**	0.68**	0.89**	-0.17**		
15. Openness	4.57	0.61	0.16**	0.47**	-0.03	0.14**	0.29**	0.19**	0.13**	0.17**	0.06	0.26**	0.58**	0.79**	-0.21**	0.76**	
16. Strategic risk taking ^a	1.74	3.90	0.03	0.07*	0.14**	0.20**	0.16**	0.33**	0.27**	0.21**	0.04	0.63**	-0.01	0.04	-0.12**	0.13**	0.20**

Note. CEO: Chief Executive Officer.

^a Units in thousands.

^b Units in millions.

*Correlation is significant at the 0.05 level (two-tailed).

**Correlation is significant at the 0.01 level (two-tailed).

TABLE 3 Results of generalized linear model analyses predicting strategic risk taking

	Model 1			Model 2a			Model 2b			Model 3a			Model 3b		
	β	SE	p-value	β	SE	p-value	β	SE	p-value	β	SE	p-value	β	SE	p-value
CEO gender	0.53	0.69	0.45	0.48	0.69	0.49	0.39	0.70	0.57	0.48	0.70	0.49	0.49	0.69	0.48
CEO tenure	-0.02	0.05	0.74	0.02	0.06	0.71	0.02	0.06	0.78	-0.04	0.05	0.48	-0.04	0.05	0.43
CEO age	0.10	0.02	0.00	0.10	0.02	0.00	0.10	0.02	0.00	0.10	0.02	0.00	0.10	0.02	0.00
CEO duality	-0.34	0.23	0.13	-0.33	0.23	0.15	-0.32	0.23	0.16	-0.35	0.23	0.12	-0.35	0.23	0.13
CEO cash compensation	-0.12	0.13	0.02	0.00	0.00	0.01	0.17	0.28	0.02	0.00	0.00	0.02	0.00	0.00	0.02
CEO prospective wealth	0.00	0.00	0.78	0.00	0.00	0.79	0.00	0.00	0.80	0.00	0.00	0.91	0.00	0.00	0.98
CEO restricted stock	0.04	0.02	0.10	0.04	0.02	0.09	0.04	0.02	0.08	0.04	0.02	0.11	0.05	0.02	0.14
CEO equity risk bearing	0.00	0.01	0.74	0.00	0.01	0.82	0.02	0.01	0.19	0.00	0.01	0.83	0.00	0.01	0.84
Firm free cash flow	-1.33	0.87	0.13	-1.37	0.87	0.12	-1.36	0.87	0.12	-1.18	0.88	0.18	-1.19	0.88	0.18
Firm size	3.87	0.19	0.00	3.89	0.19	0.00	3.84	0.19	0.00	3.88	0.19	0.00	3.88	0.19	0.00
Firm performance	-0.06	0.11	0.64	0.05	0.14	0.71	0.07	0.14	0.65	0.01	0.12	0.94	0.03	0.12	0.81
Conscientiousness				-0.13	0.10	0.19	-0.15	0.10	0.13						
Neuroticism										-0.59	0.29	0.04	-0.68	0.31	0.03
Extraversion															
Openness															
Conscientiousness \times CEO equity risk bearing							-0.07	0.03	0.04						
Neuroticism \times CEO equity risk bearing													-0.03	0.04	0.41
Extraversion \times CEO equity risk bearing															
Openness \times CEO equity risk bearing															
Years dummies	Included			Included			Included			Included			Included		
Wald Chi ²	217.33			196.75			191.35			106.68			99.88		
Nr of observations	935			935			935			935			935		

TABLE 3 (Continued)

	Model 4a			Model 4b			Model 5a			Model 5b			Model 6		
	β	SE	p-value	β	SE	p-value	β	SE	p-value	β	SE	p-value	β	SE	p-value
CEO gender	0.52	0.69	0.45	0.51	0.69	0.46	0.77	0.71	0.28	0.62	0.70	0.38	0.48	0.70	0.49
CEO tenure	-0.08	0.06	0.16	-0.08	0.05	0.14	-0.05	0.05	0.34	-0.05	0.05	0.33	-0.02	0.06	0.67
CEO age	0.11	0.02	0.00	0.10	0.02	0.00	0.10	0.02	0.00	0.10	0.02	0.00	0.10	0.02	0.00
CEO duality	-0.39	0.23	0.09	-0.43	0.23	0.06	-0.31	0.23	0.18	-0.23	0.23	0.30	-0.28	0.23	0.22
CEO cash compensation	0.00	0.00	0.03	0.00	0.00	0.06	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.05
CEO prospective wealth	0.00	0.00	0.90	0.00	0.00	0.82	0.00	0.00	0.86	-0.00	0.00	0.85	-0.00	0.00	0.43
CEO restricted stock	0.04	0.02	0.13	0.03	0.02	0.22	0.04	0.02	0.14	0.03	0.02	0.22	0.03	0.02	0.28
CEO equity risk bearing	0.01	0.01	0.53	-0.01	0.01	0.56	0.01	0.01	0.63	-0.02	0.01	0.05	-0.01	0.01	0.28
Firm free cash flow	-1.20	0.87	0.17	-1.24	0.87	0.15	-1.36	0.87	0.12	-1.23	0.86	0.15	-1.14	0.86	0.18
Firm size	3.82	0.19	0.00	3.89	0.19	0.00	3.78	0.20	0.00	3.76	0.20	0.00	3.72	0.20	0.00
Firm performance	-0.22	0.13	0.11	-0.25	0.13	0.06	-0.15	0.13	0.24	-0.22	0.13	0.08	0.05	0.16	0.77
Conscientiousness													-0.69	0.15	0.00
Neuroticism													-0.59	0.32	0.06
Extraversion	0.50	0.20	0.01	0.56	0.20	0.01				0.67	0.23	0.00	1.08	0.29	0.00
Openness							0.43	0.23	0.06				0.82	0.29	0.01
Conscientiousness × CEO equity risk bearing													-0.08	0.04	0.04
Neuroticism × CEO equity risk bearing													-0.05	0.04	0.26
Extraversion × CEO equity risk bearing				0.05	0.01	0.00				0.11	0.02	0.00	0.04	0.02	0.04
Openness × CEO equity risk bearing													0.07	0.03	0.01
Years dummies	Included			Included			Included			Included			Included		
Wald Chi ²	163.28			167.14			166.92			197.65			93.50		
Nr of observations	935			935			935			935			935		

Note. Results are for two-tailed tests. All tests two-tailed. Industry and year dummies are included in the GLM models but not listed in this table. CEO: Chief Executive Officer; GLM: generalized linear model.

demonstrating how the relationship between equity risk bearing and strategic risk taking becomes positive when CEOs have (a) low levels of conscientiousness; (b) high levels of extraversion; and (c) high levels of openness. That is, BAM's predicted relationship between risk bearing and strategic risk taking is no longer negative; the slope of the relationship changes sign once these nuances of personality are considered. Hence, although we did not hypothesize cross-over interaction effects, our findings indicate BAM's predicted negative relationship between risk bearing and strategic risk taking can only be observed for CEOs with certain personality traits; otherwise, the relationship becomes positive.

From a behavioral perspective, our results also advance the CEO decision making literature by suggesting that CEO framing of strategic decision making can be endogenous to the decision maker. That is, personality traits lead the CEO to frame strategic risk taking as (a) a threat to their wealth that is to be avoided, given the greater salience of loss outcomes; or (b) an opportunity to enhance equity wealth, given the greater salience of gain outcomes. Using the five-factor model of personality traits allows academics, analysts or boards to predict which end of the spectrum a CEO is more likely to sit. That is, conscientiousness leads to greater salience of loss outcomes, while extraversion and openness leads to greater salience of gain outcomes. This insight builds on the mixed gamble approach to behavioral agency, which suggested that CEOs are likely to estimate prospective losses and prospective gains, weighing one against the other when making strategic decisions (e.g., Bromiley, 2009; Martin et al., 2013). Specifically, our research suggests that in addition to considering the magnitude of those prospective losses and gains at the firm and personal level, CEOs will likely direct their attention to losses and gains unequally, due to factors associated with personality. Moreover, our cross-over interaction underlines the importance of considering salience of outcomes, or the endogenous framing referred to above.

With regard to the incentive alignment literature, our research provides an important boundary condition when evaluating the incentive alignment qualities of equity based pay. Seminal agency research has highlighted that equity ownership by managers aligns their financial fate and mitigates opportunism, yet creates a divergence in risk preferences, given that equity risk bearing likely means that the agent has less tolerance for risk than their shareholders (principals) (Eisenhardt, 1989). This agency problem of risk sharing has resulted in positivist agency scholars devoting much research effort to considering how to mitigate the potentially negative consequences of agent risk aversion that is predicted to result from equity grants. Our research suggests that predictions of the risk behavior that CEOs exhibit in response to equity ownership are likely to offer a useful, yet incomplete understanding of the cognitive processes that shape the CEO's response to their risk bearing. Without explicitly considering the CEO's personality, and how their personality will shape their perception of risk, we may conclude that the CEO will respond to changes in risk bearing in an opposite way to that previously predicted. In particular, extraversion, openness and low levels of conscientiousness have the potential to reverse BAM's first proposition regarding the effect of risk bearing upon risk taking. Hence, the consequences of equity incentives for incentive alignment will be vastly different if individuals diverge by at least one standard deviation from the mean for extraversion, openness and conscientiousness.

Our nonfindings with regard to neuroticism cast doubt on the role of emotional stability in shaping CEO responses to equity incentives. One explanation for this comes from the relationship between neuroticism and impulsiveness (Judge, Higgins, Thoresen, & Barrick, 1999). Impulsiveness is associated with unpredictability, suggesting limitations in our ability to accurately predict how a neurotic CEO will respond to their equity risk bearing (Dijker, Koomen, & Kok, 1997). Neurotic CEOs are also more likely to exhibit dysfunctional behaviors, yet are very self-conscious of these

behaviors, meaning they attempt to conceal external manifestations of their emotional instability (Suls, Green, & Hillis, 1998). This suggests neurotic CEOs are less likely to exhibit systematic patterns that would be detected in empirical analyses.

In terms of the behavioral literature more broadly, behavioral strategy has previously drawn upon various streams from cognitive and social psychology, including behavioral decision research (Kahneman & Lovallo, 1993), sensemaking and cognitive schema (Porac & Thomas, 1990), or behavioral theory of the firm (Cyert & March, 1963). Further, single dimension analysis of behavior effects of CEO traits such as narcissism (Chatterjee & Hambrick, 2007, 2011) or overconfidence (Li & Tang, 2010) has moved the literature forward and provided the catalyst for our research; yet we have highlighted the benefits to the predictive validity of this theory generated by also considering the influence of conscientiousness, extraversion and openness. As such, we advance a nascent but evolving literature that has underlined the role of a different stream of cognitive psychology (the “Big Five” personality traits) in helping strategy scholars advance research agendas. Specifically, our theory emphasizes the value of exploring multiple personality traits when predicting CEO behaviors, given each trait separately influences CEOs' response to compensation.

Lastly, we also contribute to upper echelons theory by demonstrating the value added of considering the interaction effects of executive characteristics and compensation on firm risk taking. Upper echelons theory emphasizes that strategic choices will be influenced by perceptions, cognition and values of their executives. Despite consistent calls for research that integrates upper echelons theory with executive compensation theory (Hambrick, 2007), there is still relatively little work that examines why executives differ in their responses to compensation arrangements. That is, the majority of research continues to study the effect of executive characteristics or incentives on risk taking in isolation. Complementing the few studies that have started to address this shortcoming (e.g., Mannor et al., 2016; Wowak et al., 2015; Wowak & Hambrick, 2010), we show that in order to understand changes in behavioral responses to compensation it is indeed important to consider differences in executives' personality. Our study suggests that executives' behavioral changes cannot solely be predicted through a compensation lens. Behavioral change can only be more accurately predicted if compensation is considered together with executives' personality.

6.2 | Practical implications

From a practical perspective, our findings underline the importance that should be placed on designing CEO compensation contracts only after analyzing the CEO's personality. The significant influence of the various personality traits in shaping CEO behaviors in response to incentives also underlines the pitfalls of relying on blanket assertions with regard to the likely behavioral effects of the CEO's compensation. Instead, our theory provides the board with a strong basis for ensuring that they design the compensation contract—including granting of stock options—so that the CEO takes risks that are consistent with the firm's strategy.

6.3 | Limitations and future research

As with all empirical projects, ours is also not free of limitations. First, our measures of the big five personality traits are inevitably imprecise in the sense that we were not able to directly measure the CEO's personality profiles. Given the focus on CEOs of the largest manufacturing firms in the US and the sensitivity of personality data, adopting a previously validated unobtrusive measure was the necessary choice. Yet, while we are confident that our previously validated measures yield generally meaningful results, further research may endeavor to develop alternative ways to measure CEO

personality (see Ligon et al., 2012). Second, we have examined our theoretical framework in the context of the manufacturing sector. This approach allows us to compare and contrast our findings with prior behavioral agency theory research. Yet, while there is no reason to believe that our results are sector-specific, we encourage future research that replicates our framework in other sectors.

Overall, we have provided a theoretical framework for analyzing the role of personality traits in predicting managerial agent (CEO) responses to equity risk bearing. The theory and empirical results underscore the importance of considering individual personality traits when designing CEO incentives or anticipating the need for additional monitoring due to the personality traits distorting the intended risk incentives created by equity based pay.

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ORCID

Mirko H. Benischke  <https://orcid.org/0000-0001-5695-5293>

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