Journal of Management
Vol. 41 No. 6, September 2015 1698–1723
DOI: 10.1177/0149206312441211
© The Author(s) 2012
Reprints and permissions:
sagepub.com/journalsPermissions.nav

What I See, What I Do: How Executive Hubris Affects Firm Innovation

Yi Tang
Hong Kong Polytechnic University
Jiatao Li
Hong Kong University of Science and Technology
Hongyan Yang
Hong Kong Polytechnic University

This study explores the potential benefits of executive hubris to firm innovation. Grounded in the upper echelons theory and the firm innovation literature, hypotheses were developed and tested in two studies with different contexts and methods. Study 1 uses a set of cross-sectional survey data on a large sample of Chinese CEOs in manufacturing industries. Study 2 uses a set of longitudinal archival data on U.S. public firms in high-tech industries. Both studies render robust support to the authors' main theoretical prediction—that executive hubris is positively related to firm innovation. The authors further found that the main effect varies under certain environmental conditions: The relationship between executive hubris and firm innovation becomes weaker when the environment is more munificent and complex.

Keywords: *executive hubris; firm innovation; environmental factors*

Acknowledgments: This article was accepted under the editorship of Deborah E. Rupp. We are grateful to Senior Associate Editor Patrick M. Wright and two anonymous reviewers for their insightful feedback during the review process. We also thank Vivian Guo, Cynthia Lee, Filippo Wezel, and workshop participants at Hong Kong Polytechnic University for helpful comments. The research is supported in part by Hong Kong Research Grants Council General Research Funds PolyU#5492/10H and HKUST#641609, Hong Kong Polytechnic University Center for Leadership and Innovation (CLI) Research Fund 4-ZZ8G, and Hong Kong Polytechnic University Department Research Fund A-PK02.

Corresponding author: Yi Tang, Department of Management and Marketing, Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong
E-mail: msytang@polyu.edu.hk

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

Recent studies in the upper echelons theory have been keen to explore how corporate executives' highly positive self-potency affects firm decisions and outcomes (Hiller & Hambrick, 2005), as "the implications of positive self-regard in executives are so substantial . . . the construct warrants serious attention and analytic pursuit" (Finkelstein, Hambrick, & Cannella, 2009: 77). Among all the studies in this emergent stream, executive hubris has attracted a fair share of attention (Hayward, Shepherd, & Griffin, 2006; Li & Tang, 2010).

Research has shown that executive hubris—generally defined as executives' extreme self-confidence (Hayward & Hambrick, 1997; Hiller & Hambrick, 2005)—can significantly affect firm acquisition premiums (Hayward & Hambrick, 1997), corporate financial policies (Malmendier & Tate, 2005), and managerial risk taking (Li & Tang, 2010). That executive hubris is harmful to firms is often implied by this extant research (Hayward et al., 2006).

Nevertheless, some of the most recent efforts in the field have started challenging this notion (Galasso & Simcoe, 2011; Hirshleifer, Low, & Teoh, 2010). Indeed, the field has recently called for research going beyond the dark side of managerial psychological biases, with Bollaert and Petit commenting that "another possibility for research in the hubris tradition is to broaden the scope of future research on executive psychology to an exploration of its productive aspects" (2010: 370). In answer to this call, and to answer the as-yet-unaddressed question of how to employ executive hubris to a firm's benefit while avoiding its downsides (Johnson & Fowler, 2011), we extend the idea of executive hubris to the context of firm innovation, a key factor determining a firm's ability to sustain its competitive advantages (Brown & Eisenhardt, 1995; Miller, Fern, & Cardinal, 2007).

Firm innovation can be defined as knowledge creation during a firm's operation (Daft, 1982; Damanpour, 1991; Wadhwa & Kotha, 2006) and may be influenced by the firm's top executives (Makri, Lane, & Gomez-Mejia, 2006; Miller & Toulouse, 1986; Yadav, Prabhu, & Chandy, 2007; Young, Charns, & Shortell, 2001). However, prior research has not paid adequate attention to the impact of executive hubris on firm innovation or the boundary conditions of this relationship. The aim of the present study is precisely to fill this gap.

We grounded our arguments in the upper echelons theory (Hambrick & Mason, 1984) and the firm innovation literature (Makri et al., 2006; Miller & Toulouse, 1986). The upper echelons theory predicts that the psychological characteristics of top executives affect firm decisions and outcomes (Hambrick & Mason, 1984). Since executives selectively allocate their attention to issues deemed important (Cyert & March, 1963; Ocasio, 1997), and hubristic executives usually deem firm innovation issues important, we suggest that hubristic executives are more attracted to firm innovation issues than they are to other firm-related issues. This leads them to allocate more valuable resources to their firms' key innovation inputs, resulting in better innovation outputs.

The relationship between executive hubris and firm innovation may depend on some important environmental factors. Following Dess and Beard's (1984) formulation, we focus on three environmental factors: environmental munificence, complexity, and dynamism. As an environmental scheme based on Aldrich's (1979) promising factor analysis, this empirically derived taxonomy has been extensively used in the strategic management research (Keats & Hitt, 1988; Wiersema & Bantel, 1993) because "it addresses environmental characteristics in a fairly parsimonious, quantitative fashion" (Palmer & Wiseman, 1999: 1039).

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

To test these ideas, we conducted two studies. One uses a set of original cross-sectional survey data on a large sample of Chinese CEOs in manufacturing industries collected in 2000. The other uses a set of longitudinal data on a sample of U.S. high-tech public firms that were in operation from 1995 through 2005. This latter data set contains archival data on top managers' forecasts on firm performance and firm patenting activities.

This research makes several contributions. First, this research extends both the upper echelons theory and the firm innovation literature by examining the impact of executive hubris on the innovation performance of a firm. Executive hubris, as a type of top executive psychological bias, has been shown to influence firm-level decisions and outcomes significantly (Hayward & Hambrick, 1997; Li & Tang, 2010). But prior research on firm innovation has been somewhat silent on how top executives' psychological biases may influence this important firm-level outcome. The present research builds a direct link between the two and explores the conditions under which executive hubris may actually benefit firms in areas such as innovation.

Second, this research reveals the underpinnings of the relationship between executive hubris and firm innovation by examining the moderating role of environments, an important construct governing the impact of executive characteristics on firms (Finkelstein & Hambrick, 1996). The economic, social, and institutional environments of a firm "govern the allocation of time, effort, and attention focus of organizational decision makers in their decision-making activities" (Ocasio, 1997: 195). As a hubristic executive is biased toward innovation issues, leading to better innovation performance, we emphasize the role of the task environment an executive is facing in moderating the effect of executive hubris on firm innovation. Understanding the moderating effect of environments will, in turn, help us understand how executive psychological biases—hubris, in our context—affect firm decisions and outcomes.

Third, this research enriches the understanding of executive hubris and firm innovation through two separate studies with distinct contexts, data collection methods, measures of executive hubris, and indicators of firm innovation. This way, the generalizability and robustness of our findings are enhanced.

Theoretical Background

Corporate Executives and Firm Innovation

The upper echelons theory suggests that top executives' characteristics can significantly affect a firm's decisions and their consequences (Hambrick & Mason, 1984). Firm innovation is an important outcome, and there is evidence that it can be affected by the characteristics of a firm's top executives. The existing research has explored this issue by examining top executives' demographic characteristics. For example, in a study of public hospitals looking to adopt innovative management practices, Young and his colleagues (2001) found that when the top manager was older, was better educated, and had prior exposure to innovative practices, the hospital was more likely to adopt such practices.

In addition to such demographic factors, researchers have identified the psychological or cognitive characteristics of executives that may influence decision making and hence

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

innovation. For instance, Miller and Toulouse (1986) showed that top managers with an internal locus of control pursued more product innovation. Berson, Oreg, and Dvir (2008) found that corporate executives with self-directive values were associated with innovation-oriented organizational cultures.

Thus, it is expected that both the demographic and deeper level characteristics of CEOs can influence firm innovation. Although prior research applying the upper echelons theory has usually focused on demographic characteristics (Hambrick, 2007), some studies have emphasized deeper level traits (Chatterjee & Hambrick, 2007). Among those traits, executive hubris, reflected in the hyperlevel of self-potency (Hiller & Hambrick, 2005), has attracted much scholarship (Hayward & Hambrick, 1997; Li & Tang, 2010).

Executive Hubris

The emergent studies affiliated with the upper echelons theory have explored the implications of managerial self-potency through different lenses, including hubris (Hayward & Hambrick, 1997; Li & Tang, 2010), overconfidence (Simon & Houghton, 2003), optimism (Hmieleski & Baron, 2009), and narcissism (Chatterjee & Hambrick, 2007). The common theme of these dimensions resides in the basic, fundamental assessment an executive makes of himself or herself, especially when such a self-assessment is overly positive (Hiller & Hambrick, 2005). To synthesize all related efforts, based on the fundamental work by Judge and his colleagues (Judge, Erez, Bono, & Thoresen, 2002; Judge, Lock, & Durham, 1997), Hiller and Hambrick proposed grouping all dimensions of managerial biases under one single overarching conceptual umbrella known as "executive core self-evaluation (CSE)." The well-studied concept of executive hubris corresponds exactly to a hyperlevel of executive CSE (Hiller & Hambrick, 2005: 306).

Executive hubris is an exaggerated belief in one's own judgment that deviates from objective standards (Hayward & Hambrick, 1997; Hayward et al., 2006; Hiller & Hambrick, 2005). When an individual's confidence in the accuracy of his or her own predictions exceeds the actual accuracy of those predictions, he or she may be considered hubristic (Hilary & Menzly, 2006; Klayman, Soll, Gonzales-Vallerjo, & Barlas, 1999; Moore & Healy, 2008; Simon & Houghton, 2003). Hubris, as a psychological bias, may be prominently exhibited among corporate executives (Hiller & Hambrick, 2005).

Researchers have long investigated the potential consequences of executive hubris on firm decisions and outcomes, both conceptually and empirically. Their findings generally show that executive hubris may lead to more value-destroying merger-and-acquisition activities (Malmendier & Tate, 2008), greater acquisition premiums (Hayward & Hambrick, 1997), higher chances of venture failure (Hayward et al., 2006), poorer performance (Lowe & Ziedonis, 2006), investment distortions (Malmendier & Tate, 2005), and excessive risk taking (Li & Tang, 2010; Simon & Houghton, 2003). Most of these previous efforts tended to emphasize the potential costs of executive hubris for firms.

Insightful as these previous efforts are, they have largely neglected the other side of the story—whether and how executive hubris can lead to beneficial outcomes. We therefore make the effort to explore in which direction and to what extent hubristic executives influence firm innovation.

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

Hypotheses

Executive Hubris and Firm Innovation

Researchers have shown that individuals' cognitive heuristics, including hubris, may work together with their attention allocation in influencing decision making (Peng & Xiong, 2006). We propose that hubris will lead a corporate executive to focus his or her attention on innovation. First, pursuing innovative projects is likely to be consonant with the self-image of an executive who is strongly ego driven or self-aggrandizing. A hubristic executive would normally think of himself or herself as someone who is in control, efficacious, and even a miracle worker (Hayward & Hambrick, 1997). Innovative projects are difficult, risky, and challenging because innovations can come about only through the application of new business methods, the development of new technologies, and the exploration of new markets. The outcomes of innovative projects are hard to predict (March, 1991). In addition, hubristic decision makers are particularly prone to the "difficulty effect" (Griffin & Tversky, 1992), as they tend to believe themselves to be better at difficult tasks than at easy ones. As the success of innovation projects may be perceived by others as an indication of strong managerial vision or ability (Westley & Mintzberg, 1989), a hubristic executive is likely to leap at the opportunity to take on such talent- and vision-sensitive projects.

Second, a hubristic executive tends to overestimate his or her problem-solving abilities and is thus inclined to overestimate the expected payoffs from innovative endeavors (Li & Tang, 2010; Simon & Houghton, 2003). Just as Moore and Healy put it, hubris leads to "the overestimation of one's actual ability, performance, level of control, or chance of success" (2008: 502). For instance, Camerer and Lovallo (1999), using a laboratory study, found that hubris causes decision makers to take more risky actions, as they believe they will prevail despite the high rates of failure. Hubristic executives who expect a higher chance of success and a lower chance of failure are more inclined to take risks, and so they will pay more attention to innovation and pursue it with greater vigor (Galasso & Simcoe, 2011).

Third, a hubristic executive is more likely to exhibit a strong "internal locus of control" as hubristic decision makers tend to believe they hold more information than they actually have and normally consider their own information as more valuable (Bernardo & Welch, 2001; Hayward & Hambrick, 1997). A decision maker with an internal locus of control is convinced that the outcomes of his or her behavior are the results of his or her own efforts (Rotter, 1966). This implies that hubristic executives believe their decision making to be less determined by the factors beyond their control and more determined by the ones within their control. This is because executives with an internal locus of control are more convinced of their own abilities to influence their environments; in contrast, executives with an external locus of control are likely to be more passive because they believe events are beyond their control. This "internal locus of control" characteristic has important implications for firm innovation. Executives with an internal locus of control are likely to exhibit more entrepreneurial qualities than those with an external locus of control (Miller, Kets de Vries, & Toulouse, 1982). They are also more interested in innovation. For example, Miller and Toulouse (1986) showed that top managers with an internal locus of control are more likely

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

to pursue product innovation. Therefore, perceiving the internal and external situations as under their control tends to alleviate any concerns about the investment in innovation, encouraging hubristic executives to pay more attention to innovation issues.

Based on the above arguments, as executives' hubris increases, they become more attracted to the potential high payoffs of firm innovation and therefore allocate more managerial attention to it, neglecting all the associated external and internal uncertainties. According to the attention-based view of the firm, "What decision-makers do depends on where they focus their attention" (Barnett, 2008: 606). Executive attention is a valuable and scarce resource in organizations because problems compete for the limited attention of decision makers (Cyert & March, 1963). The attention allocation of major decision makers in a firm significantly influences the firm's decisions and outcomes (Cho & Hambrick, 2006; Ocasio, 1997), including firm innovation. For example, studying the U.S. retail banking industry, Yadav and his colleagues (2007) showed that executive attention is a critical driver of innovation: When the executive's attention exhibits greater future and external focus, innovations are more likely occur in the bank. Therefore, it is expected that the more attention executives pay to key innovation issues and potential solutions, the more likely it is for them to give priority to innovation and inject resources into this area. And so the firm's innovation performance will improve. In sum, an increase in executive hubris will lead to higher firm innovation performance.

Hypothesis 1: There is a positive relationship between executive hubris and firm innovation.

The Moderating Role of Environmental Factors

If executive hubris can, to some extent, benefit firm innovative performance, the next question is, Which factors set the boundary conditions for this effect? We further explore the potential contingent scope bounding this relationship. While it is difficult to directly model and measure managerial attention on innovation, it is possible to identify some contingent factors that are thought to affect the extent to which managerial attention may be influenced (Wang & Qian, 2011). We argue that those factors influencing managerial attention allocation should set the boundary conditions for the said relationship. The attention-based view has suggested that environmental factors play an important role in influencing decision makers' attention allocation within organizations (Ocasio, 1997). Therefore, we emphasize the role of the task environment an executive is facing in moderating the main effect of executive hubris on firm innovation. We argue that under certain task environments, executives are able to focus their attention on those areas they are most interested in (innovation in this case), thereby strengthening the main relationship between executive hubris and firm innovation; in contrast, under other task environments, executives' attention is distracted, thereby weakening the relationship between executive hubris and firm innovation. We follow Dess and Beard's (1984) formulation and examine three environmental factors: environmental munificence, complexity, and dynamism.

Environmental munificence describes the task environment's capacity to support sustained growth (Dess & Beard, 1984). A munificent environment provides more opportunities to firms (Hambrick & Finkelstein, 1987). So in a munificent environment, executives may come

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

across a lot of temptations, and they must choose among multiple options when determining strategic directions. They tend to face greater job demands (Hambrick, Finkelstein, & Mooney, 2005), and their attention will be distracted from the focal area (innovation in this case) and spread across multiple strategic areas. For a hubristic executive this distraction may be even stronger, as he or she may become even more aggressive in expanding firm strategic initiatives. Therefore, the executive's initial attention on firm innovation may be distracted. So the relationship between executive hubris and firm innovation will be weaker.

Hypothesis 2a: Environmental munificence weakens the positive relationship between executive hubris and firm innovation.

Environmental complexity defines the extent to which a firm's operating environment is competitive and heterogeneous (Aldrich, 1979; Dess & Beard, 1984). Environmental complexity is likely to increase as industry concentration decreases (Keats & Hitt, 1988) and the number of competitors increases (Palmer & Wiseman, 1999). The rise of environmental complexity should increase the intricacy of interfirm relationships and possibly the potential interconnectedness of competitors as well (Grimm, Lee, & Smith, 2006). Therefore, the scope for maneuvering without being detected is enhanced in a complex environment. This in turn requires executives to devote more attention to interfirm competition and collaboration. Thus executives running firms in more complex environments are normally less able to focus their attention on those areas they are most interested in; their attention tends to be distracted instead.

Hypothesis 2b: Environmental complexity weakens the positive relationship between executive hubris and firm innovation.

Environmental dynamism describes the extent to which a firm is faced with an unpredictable and unstable environment (Aldrich, 1979; Finkelstein & Boyd, 1998). In the absence of environmental dynamism, firm performance is often simply a reflection of how much firms are able to take advantage of their existing resources and capabilities (Barney, 1991). However, when the firm's operating environment is highly dynamic, previously developed capabilities and routines may not be able to keep up with the changes in product and technological conditions (Anderson & Tushman, 1990), leading to a mismatch between the firm's existing capabilities and its environment (Wang & Li, 2008). Therefore, environmental dynamism can cause the linkages between task behaviors and performance outcomes to become obscure (i.e., there is considerable means–ends ambiguity; Simsek, Heavey, & Veiga, 2010: 112), which makes it more difficult for executives to make the correct decisions. Therefore, when firms are faced with high levels of environmental dynamism, the job demands on top executives are much greater. When this happens, executives will find it more difficult to concentrate their attention on the areas they are most interested in (firm innovation in this case). When an executive's attention is distracted from the focal area of innovation, the main relationship between executive hubris and firm innovation will weaken.

Hypothesis 2c: Environmental dynamism weakens the positive relationship between executive hubris and firm innovation.

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

Study 1 Method

Data

We first conducted Study 1 to establish the baseline relationship between executive hubris and firm innovation. Study 1 relies on data from a cross-sectional survey conducted in China. With the purpose of understanding the problems firms encounter as they learn to face market competition and technological innovation during China's transition into a market-driven economy, China's government-funded Entrepreneurs Survey System regularly surveys Chinese CEOs. The firms led by the CEOs surveyed constitute a proportional sample based on industry, location, ownership, and size.

This study uses part of the data from the survey conducted in 2000. In the survey, a questionnaire was mailed out to each of 15,000 firms, and 5,075 usable responses were received (out of a total of 5,126 responses). The survey agent reported no significant industry, location, ownership, or size differences between respondents and nonrespondents.

To maintain the comparability of the industry backgrounds while avoiding excessive loss of generality, this study focuses on the 3,073 firms in manufacturing industries surveyed at the time,[1] which made up the majority of the surveyed firms (about 60.55% of the full sample). After excluding those firms for which data were missing, the final sample was made up of 2,820 firms. Unpaired *t* tests indicated no significant differences in executive hubris and firm size between firms included in the analyses and those excluded (about 200 firms).

Measures

Firm innovation. Following the methods employed in previous research (Lichtenthaler, 2009; Song, Dyer, & Thieme, 2006), we measured a firm's innovation performance in each year by the ratio of sales of new products to the firm's total annual revenue. Since the measure is based on the market performance of new products, it captures the technical process of innovation. That is, the measure implies that the new products under analysis have gone through production and marketing processes, which is consistent with the common understanding of product innovation in the innovation literature (Garcia & Calantone, 2002; Laursen & Salter, 2006). We took the square root of this ratio to reduce skewness.

Executive hubris. The essence of hubris is to overestimate the correctness of one's own judgments (Hayward & Hambrick, 1997; Kahneman & Tversky, 1995). The deviation of a CEO's subjective evaluation (i.e., perception) of his or her firm's performance from its actual performance was used to measure executive hubris (Li & Tang, 2010). In the survey, each CEO was asked to evaluate his or her firm's most recent financial performance (the preceding half year in our context), using a 5-point scale (1 = *a large loss* to 5 = *a large profit*). The actual performance was measured by return on sales (ROS) for that same half year, as reported by each CEO in the survey.[2] Since both the subjectively anchored evaluation and the concretely anchored response depended strongly on the industry, both values were adjusted by subtracting

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

from them the respective mean values of all sampled firms in the same industry. To make the two measures comparable, both the subjective evaluation and the ROS were converted to *z* scores. Executive hubris was captured by the *z* score of the subjective evaluation minus the *z* score of the ROS, and the greater the difference, the greater the executive hubris.[3]

This executive hubris measure reflects the difference score for capturing congruence between two variables. Given the problems associated with the use of difference scores (for a review, see Edwards, 2002), we ran the analysis using polynomial regression, following Edwards and Parry (1993). In our context, studying executive hubris implied by an algebraic difference score requires a linear equation that uses both component measures as predictors (Edwards, 2002). However, we found no significant difference in R^2 between the constrained model (the one using difference scores) and the unconstrained model (the one using polynomial regression). Because the difference score measure in our study is aligned with our conceptual elaboration of executive hubris, and polynomial regression did not provide additional benefit, we decided to use the difference score measure, as has been the traditional practice in research on top management and the upper echelons theory, in particular (Cruz, Gomez-Mejia, & Becerra, 2010).

We carefully checked for any potential outliers in the set of executive hubris values and found that less than 1.7% was below the value of –2.5 and only 0.7% was above the value of 2.5 (the mean was around 0, the median was 0.28, the minimum was –12.39, and the maximum was 6.31). Adjustments were made to these data to reduce the influence of outliers by using the Winsor technique, which replaces the *n* highest and/or *n* lowest values with the next value, counting inward from the extremes (Barnett & Lewis, 1994). This technique has been recommended for obtaining accurate regression model estimates (Kennedy, Lakonishok, & Shaw, 1992). We winsorized the value of executive hubris at the 1st and 99th percentiles.

Control variables. To rule out alternative explanations, a set of control variables were included in the analysis. Firm size was measured by the logarithm of the firm's total assets. We controlled for firm slack, measured as the ratio of debt to equity, reverse coded, since a high level of debt lowers a firm's borrowing capacity (Bourgeois, 1981; Singh, 1986). It is also important to control for the intangible resources of the firm because intangible resources may influence the firm's actual innovation performance. So we included two variables: R&D intensity and human resource (HR) investment. A firm's R&D intensity was measured by the ratio of R&D expenditure to sales. HR investment was represented by the ratio of training expenditures to sales. Firm overall performance also was controlled for and measured comprehensively. In the survey, the respondents were invited to rate the overall prior performance of their firms along 10 dimensions with scores from 1 to 3, with 3 indicating *good* and 1 *not good*.[4] The correlations among those ratings were positive and significant, and the reliability coefficient (Cronbach's alpha) was .81. So we used the average of the ratings to indicate the firm's overall prior performance. As managerial discretion is highly constrained in Chinese state-owned firms (Li & Tang, 2010), a dummy variable for state ownership also was included, with about 46% of the sampled firms being wholly state owned or state controlled. Industry dummies and location dummies were included to control for any industry-level or location-level influence.

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

Table 1
Study 1: Descriptive Statistics and Correlations Among Key Variables

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. Firm innovation (new product sales)	3.13	2.86							
2. Executive hubris	0.03	0.97	.07						
3. Firm size[a]	8.12	3.05	.11	.04					
4. Firm R&D intensity	3.42	7.09	.36	–.03	–.03				
5. Firm human resource investment	1.33	3.92	.24	–.04	–.05	.53			
6. Firm slack	0.47	0.43	.01	.17	–.25	.06	.06		
7. Firm performance	1.98	0.41	–.14	–.36	–.09	–.08	–.02	–.15	
8. If state-owned (*yes* = 1)	0.46	0.50	–.03	–.13	.16	–.07	–.11	–.17	.14

Note: Correlation coefficients with a magnitude greater than .04 are significant at the $p < 0.5$ level.
a. Logarithm of firm total assets.

Models

For analyzing firm innovation performance, new product sales was left censored at 0 (no value was below 0), and a Tobit-censored normal regression model was employed (Wooldridge, 2002). The structural equation of a Tobit model is $y_i = X_i\beta + \varepsilon_i$, where y_i is a latent variable that is observed for values greater than τ (in our context, $\tau = 0$) and is censored otherwise.

Endogeneity Check

It is necessary to check for possible endogenous relationships between executive hubris and firm innovative performance, as the observed relationship may have been due to other unobservable factors. We address this issue by conducting a Durbin-Wu-Hausman endogeneity test (Wooldridge, 2002), using whether the CEO was also the founder of the firm as the instrumental variable. A good instrumental variable should be highly correlated with the potentially endogenous variable (executive hubris, in our context) but not too correlated with the dependent variable (firm innovation, in our context; Kennedy, 2008). Founder CEOs differ from nonfounder CEOs in terms of cognitive schemas (Begley & Boyd, 1987). It is said that founders "differ substantially from agents for the knowledge, values, and attitudes they bring to bear in managing the firm" (Souder, Simsek, & Johnson, 2012: 24); however, whether the CEO is the founder or not may not be directly linked to firm innovation performance. Therefore, whether a CEO is the founder of the firm is a suitable instrumental variable in our context. The Durbin-Wu-Hausman test failed to refute the null hypothesis, indicating that endogeneity should not be a concern in this study (Hausman, 1978).

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

Table 2
Study 1: Estimates of Firm Innovation (new product sales)

Variable	Model 1	Model 2
Firm size	0.196***	0.193***
	(0.026)	(0.026)
R&D intensity	0.169***	0.170***
	(0.012)	(0.012)
Human resource investment	0.089***	0.091***
	(0.021)	(0.021)
Firm slack	–0.217	–0.269
	(0.178)	(0.179)
Firm performance	–1.143***	–1.005***
	(0.185)	(0.195)
If state-owned	0.051	0.072
	(0.157)	(0.157)
Executive hubris		0.184*
		(0.082)
Location dummies	Yes	Yes
Industry dummies	Yes	Yes
Constant	1.078	0.820
	(0.700)	(0.709)
N	2,820	2,820
LR χ^2	720.03***	725.00***
Log-likelihood	–5,734.13	–5,731.64

Note: For estimating Models 1 and 2, a Tobit model was used.
*$p < .05$. **$p < .01$. ***$p < .001$ (one-tailed test for hypothesis testing, two-tailed test for others).

Study 1 Results

Table 1 presents descriptive statistics and correlations for the variables. The correlations among independent variables do not reveal any serious multicollinearity problem, showing a mean variance inflation factor (VIF) of 1.22 and a maximum VIF of 1.42.

Models 1 and 2 in Table 2 present the Tobit estimates of firm innovation, indicated by new product sales. Model 1 included all the control variables. Firm prior performance was negatively related to firm innovation ($p < .001$). The larger the firm is, the better the innovation performance ($p < .001$). Both investment in R&D and investment in HR have positive effects on firm innovation ($p < .001$). Model 2 included the executive hubris measure. The results suggest that executive hubris has a positive relationship with firm innovation ($p < .05$). Therefore, the baseline relationship stated in Hypothesis 1 is supported in Study 1.

Study 2 Method

Study 1 helps establish the baseline relationship between executive hubris and firm innovation. However, Study 1 suffers from some critical drawbacks. First, the measure of

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

executive hubris in Study 1 does not capture the "future-oriented" nature of being hubristic. Second, the data used in Study 1 are cross-sectional, and reverse causality cannot be ruled out. Third, a major part of the data in Study 1 is essentially self-reported by CEOs (a single source), leading to concerns about common method bias (Doty & Glick, 1998). To overcome these drawbacks and enhance the generalizability of our findings, we conducted Study 2, which measures executive hubris based on a future-oriented indicator and relies on a set of longitudinal archival data. Importantly, we test the relationship between executive hubris and firm innovation in the high-tech industries, a context where firm innovation is critically important for firm success (Coy, 2000; Leary, 2002). This improved measure of executive hubris also provides more leeway for us to test the moderating effect of environmental factors on the main relationship between executive hubris and firm innovation.

Data

Study 2 uses a sample of U.S. publicly listed firms in the high-tech industries, which play a pivotal role in what is nowadays known as the "creative economy" (Coy, 2000). More than half of the worldwide economic growth from 1945 to 2002 is attributed to innovations within the high-tech industries (Leary, 2002). Following prior research on high-tech industries (DeVol, 1999; Markusen, Hall, & Glasmeier, 1986; Saxenian, 1994), we identified the public firms in six high-tech industries with the following three-digit SIC codes: 283 (drugs), 357 (office, computing, and accounting machines), 366 (communication equipment), 367 (electronic components and accessories), 481 (telephone communication services), and 737 (computer and data processing services). The sample was constructed from the intersection of the COMPUSTAT database, the First Call Company Issued Guidelines database, and the National Bureau of Economic Research (NBER)'s patent database over the period 1995-2005. After deleting the firms with data missing in the databases, the final sample contained 3,285 firm-year observations.

Measures

Firm innovation. Following prior research (Hirshleifer et al., 2010; Yang, Phelps, & Steensma, 2010), we measured firm innovation using two indictors based on patent data. Data on patent counts and patent citations were constructed using the 2006 edition of the NBER patent database (Hall, Jaffe, & Trajtenberg, 2001). The database covers over 3.2 million patent grants and 23.6 million patent citations from 1976 to 2006 and contains information such as patent assignee names and their COMPUSTAT-matched identifiers, the number of citations received by each patent, the technology class of the patent, among other details.

Our first innovation measure is the total number of successful patent applications for a firm in a year (Yang et al., 2010), counted in the year of application to capture the precise timing of innovation.

Our second innovation variable is the number of total forward citations the patents of a firm granted in a certain year have altogether received by the year 2006 (Hirshleifer et al., 2010). For example, if firm A and firm B were each granted two patents (a1 and a2 for firm A; b1 and b2 for firm B) in year 1991, and a1, a2, b1, and b2 had received two, three, zero,

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

and 17 forward citations, respectively, by year 2006, the innovation performance of firm A in year 1991 is 2 + 3 = 5, while the innovation performance of firm B in year 1991 is 0 + 17 = 17. The number of citations received by a patent is considered a good indicator of the technological importance, and hence the private value, of an innovation (Hall et al., 2001; Harhoff, Narin, Scherer, & Vopel, 1999). To address the post-2006 truncation bias we adjusted the raw citation count number for each patent using the weighting index of Hall et al. (2001) before aggregating across all patents for the firm-year.

As both variables were highly skewed across the sampled firms and a significant portion of the data had a value of zero (this fact rules out the possibility of logarithmic transformation), we took the square root of them in our analyses.

In addition, to rule out any potential reverse causality, dependent variables were measured at $t + 1$, while the predicators and control variables were measured at t in the analyses.

Executive hubris. We improve upon the measure of executive hubris in Study 1 by taking into consideration the fact that the nature of being hubristic is to predict firm performance in an extremely self-confident manner. Therefore, we measured executive hubris based on management forecast error. Previous research has used management forecast data to indicate managerial self-potency (Ben-David, Graham, & Harvey, 2006). Top executives (normally CEOs who tend to be well-informed by their CFOs) in firms can make forecasts about their firms' future earnings performance. These forecasts reflect their subjective interpretations of their firms' situations. But the actual earnings performance may be different. Hubris describes the extent to which one's subjective judgment is positively biased (Kahneman & Tversky, 1995). The more positive the management forecast is in comparison with the firm's actual performance, the more hubristic the executives are said to be. Following this logic, executive hubris was measured by the deviation between the earnings forecast made by the firm's top executives before earnings announcement and the actual earnings performance , scaled by the absolute value of earnings performance. That is, executive hubris = (earnings forecast – actual earnings)/the absolute value of the actual earnings. If an executive made multiple earnings forecasts in one year, we take the average of those forecasts. We collected management earnings forecast and actual earnings data from the First Call Company Issued Guidelines database. Similar to what was done in Study 1, to reduce the influence of outliers, we winsorized the value of executive hubris at the 5th and 95th percentiles after carefully checking the values of the measure.

Similar to the hubris measure used in Study 1, this executive hubris measure based on management forecast error may also be subject to the methodological problem of difference scores. Difference scores are likely to have some limitations when applied to traditional regression analysis because of their distribution (Edwards, 2002; Edwards & Parry, 1993). The analytical techniques used in Study 2 (a panel data analysis with fixed effects) are not constrained by the distribution of difference scores, and so management forecast error as a difference score should be aligned with the conceptual formulation of executive hubris. In addition, this difference score has been commonly used in the financial accounting research (Gong, Li, & Xie, 2009).

Moderators. We measured the three environmental factors following the convention in the field (Li & Tang, 2010; Palmer & Wiseman, 1999; Wang & Li, 2008). The required data

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

were all collected from the COMPUSTAT database. *Environmental munificence* was measured by the average growth in industry sales over the prior 5 years (Castrogiovanni, 2002; Keats & Hitt, 1988). A robustness check in which environmental munificence was measured by the average growth in employment over the prior 5 years gave consistent results (Palmer & Wiseman, 1999).

Industries of low concentration comprise numerous heterogeneous firms all with their own competitive strategies (Dess & Beard, 1984; Keats & Hitt, 1988). Because low industry concentration corresponds to high environmental complexity, *environmental complexity* was thus measured by 1 minus the four-firm concentration ratio, which was calculated by dividing the combined sales of the four largest firms in COMPUSTAT (ranked by sales) within each industry by the total sales of that industry where the industry is defined according to the three-digit Standard Industrial Classification (SIC) system (Palmer & Wiseman, 1999). In a robustness check, we also measured environmental complexity, using the sheer number of competitors (in thousands) in an industry, averaged over the 5 years (Li & Tang, 2010), and the results were consistent.

In the literature, the measure of environmental dynamism typically captures variance in industry characteristics such as industry sales (Keats & Hitt, 1988; Palmer & Wiseman, 1999). *Environmental dynamism* was thus measured by the instability of industry sales over the prior 5 years (Bergh & Lawless, 1998), which was calculated by regressing industry sales against time and dividing the standard errors of the regression slope coefficients by the mean sales (Dess & Beard, 1984). This particular measure has been widely used in the field (Krishnan, Martin, & Noorderhaven, 2006; Li & Tang, 2010; Wang & Li, 2008).

Control Variables

Firm size was measured by the logarithm of the firm's total employment. Because R&D intensity may influence the firm's actual innovation performance, we also controlled for a firm's R&D intensity by the ratio of R&D expenditure to total assets. Firm performance, indicated by return on assets, was controlled for. Following prior research (Hirshleifer et al., 2010), firms with missing R&D information in the COMPUSTAT database are assigned a zero R&D value and kept in the sample; that is, not reporting the amount of R&D as a separate line item indicates that the figure did not cross the materiality threshold under Generally Accepted Accounting Principles. Our results are robust to deleting firms with missing R&D values.

We also controlled for the ratio of firm intangible assets to total assets. Intangible assets, which also may affect firm innovation, are the long-term resources of an entity, even though they have no physical existence. They derive their value from intellectual or legal rights and from the value they add to the other assets. Intangible assets are generally classified into two broad categories: (1) limited-life intangible assets, such as patents, copyrights, and goodwill, and (2) unlimited-life intangible assets, such as trademarks (Konar & Cohen, 2001).

We considered two slack variables: Potential slack was measured by the inverse of the ratio of debt to equity (Bromiley, 1991); unabsorbed slack was measured by the ratio of quick

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

Table 3
Study 2: Descriptive Statistics and Correlations Among Key Variables[a]

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10
1. Patent numbers	1.69	4.35										
2. Patent citations	5.78	14.98	.92									
3. Executive hubris	0.07	0.42	.01	.00								
4. Firm size[a]	0.23	1.76	.48	.46	.03							
5. Firm R&D intensity	0.19	0.41	–.02	–.00	–.05	–.23						
6. Firm intangible asset ratio	0.13	0.16	–.10	–.07	.02	.13	–.09					
7. Firm slack	0.00	0.84	–.09	–.07	–.07	–.32	.15	–.11				
8. Firm performance (return on assets)	–0.11	0.49	.08	.06	–.01	.21	–.19	.01	.04			
9. Environmental munificence	0.17	0.14	–.04	–.08	.05	–.15	.01	–.15	.03	–.20		
10. Environmental complexity	0.52	0.10	–.04	–.05	–.01	.06	.07	.02	.01	.05	.16	
11. Environmental dynamism	0.03	0.02	–.03	.02	–.02	–.08	–.04	–.08	.11	–.11	.39	–.04

Note: Correlation coefficients with a magnitude greater than .04 are significant at the $p < 0.5$ level.
a. Logarithm of firm total employment.

assets (cash and marketable securities) to liabilities (Greve, 2003). The correlation between the two indicators was .70. To form a comprehensive measure of firm slack, we first standardized the two indicators (transforming them into *z* scores) and then used the average as the combined firm slack measure. In a robustness check, we also conducted a factor analysis for two slack indicators and used the factor score as the measure. The results were consistent. Finally, we also included year dummies in all models.

Models

As our data are a set of unbalanced panel data, and to control for unobservable firm heterogeneity, we estimated our models using a panel linear regression with firm fixed effects and calculated the robust standard errors. Formally, the model can be formulated as $y_{i,\,t+1} = \beta_0 + \beta_1 x_{it} + \alpha_i + \mu_{it}$, where α_i, which is referred to as a fixed effect (Wooldridge, 2002), captures all unobserved, time-constant factors that affect $y_{i,\,t+1}$.

Study 2 Results

Table 3 presents descriptive statistics and correlations of the variables. The coefficients of correlation between pairs of independent variables were not particularly high. A further check of the VIF, whose mean was 1.14 and whose maximum was 1.31, did not reveal any serious multicollinearity problem. Again, to avoid any possible collinearity among the interaction terms, the variables involved in the interaction terms were mean centered (Aiken & West, 1991).

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

Table 4
Fixed-Effect Estimates of the Number of Patents (square root)

Variable	Model 3	Model 4	Model 5	Model 6	Model 7
Firm size	0.544***	0.555***	0.520***	0.545***	0.532***
	(0.149)	(0.148)	(0.148)	(0.149)	(0.148)
R&D intensity	–0.363	–0.365	–0.316	–0.364	–0.322
	(0.359)	(0.358)	(0.358)	(0.359)	(0.358)
Intangible asset ratio	–0.177	–0.167	–0.103	–0.173	–0.114
	(0.513)	(0.512)	(0.513)	(0.514)	(0.512)
Firm slack	–0.153	–0.166	–0.151	–0.153	–0.166
	(0.117)	(0.117)	(0.117)	(0.117)	(0.117)
Firm performance	0.197	0.223	0.203	0.198	0.225
	(0.136)	(0.135)	(0.135)	(0.136)	(0.135)
Environmental munificence	–6.559***	–6.532***	–6.521***	–6.531***	–6.575***
	(0.953)	(0.951)	(0.951)	(0.955)	(0.951)
Environmental complexity	–2.784	–2.972	–2.911	–2.787	–3.081*
	(1.543)	(1.540)	(1.540)	(1.543)	(1.537)
Environmental dynamism	–1.755	–1.560	–1.727	–1.889	–1.158
	(4.224)	(4.213)	(4.214)	(4.233)	(4.218)
Executive hubris	0.212*	0.213*	0.168	0.217*	0.163
	(0.126)	(0.125)	(0.126)	(0.126)	(0.126)
Hubris × Munificence		–2.934***			–3.062***
		(0.838)			(0.940)
Hubris × Complexity			–3.959***		–3.420**
			(1.191)		(1.204)
Hubris × Dynamism				–3.195	8.848
				(6.460)	(7.165)
Year dummies	Yes	Yes	Yes	Yes	Yes
Constant	2.153	2.013	1.944	2.129	1.893
	(3.244)	(3.236)	(3.237)	(3.245)	(3.231)
N	3,285	3,285	3,285	3,285	3,285
F	28.77***	28.17***	28.10***	27.46***	26.31***
R^2 (overall)	.224	.229	.228	.224	.232
R^2 (within)	.141	.142	.138	.141	.137
R^2 (between)	.217	.219	.215	.218	.215

*p < .05. **p < .01. ***p < .001 (one-tailed test for hypothesis testing, two-tailed test for others).

Our findings are summarized in Tables 4 and 5. Table 4 displays the fixed-effect estimates of the number of patent applications (square roots) as one of the indicators of firm innovation. Model 3 included all the control variables, the moderating variables, and the main independent variable, executive hubris. The results suggest that the larger the firm was, the more patent applications it filed (p < .001). Environmental munificence had a negative effect on firm innovation (p < .001). Executive hubris was positively related to this indicator of firm innovation (p < .05), again supporting Hypothesis 1.

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

Table 5
Fixed-Effect Estimates of the Number of Patent Citations (square root)

Variable	Model 8	Model 9	Model 10	Model 11	Model 12
Firm size	1.538**	1.565**	1.467**	1.545**	1.498**
	(0.491)	(0.490)	(0.491)	(0.491)	(0.491)
R&D intensity	–0.320	–0.327	–0.183	–0.328	–0.206
	(1.186)	(1.184)	(1.185)	(1.186)	(1.184)
Intangible asset ratio	–0.962	–0.937	–0.744	–0.928	–0.749
	(1.696)	(1.693)	(1.694)	(1.696)	(1.693)
Firm slack	–0.198	–0.232	–0.191	–0.196	–0.220
	(0.388)	(0.387)	(0.387)	(0.388)	(0.387)
Firm performance	0.492	0.557	0.510	0.504	0.562
	(0.448)	(0.448)	(0.447)	(0.448)	(0.448)
Environmental munificence	–20.494***	–20.426***	–20.383***	–20.262***	–20.331***
	(3.148)	(3.144)	(3.143)	(3.153)	(3.146)
Environmental complexity	1.531	1.060	1.157	1.503	0.806
	(5.097)	(5.093)	(5.089)	(5.096)	(5.088)
Environmental dynamism	13.938	14.425	14.020	12.817	14.377
	(13.952)	(13.934)	(13.927)	(13.979)	(13.960)
Executive hubris	0.821*	0.823*	0.690*	0.856*	0.708*
	(0.415)	(0.414)	(0.417)	(0.416)	(0.418)
Hubris × Munificence		–7.338**			–6.149*
		(2.771)			(3.110)
Hubris × Complexity			–11.604**		–10.209**
			(3.938)		(3.986)
Hubris × Dynamism				–26.803	–.988
				(21.332)	(23.713)
Year dummies	Yes	Yes	Yes	Yes	Yes
Constant	5.528	5.178	4.914	5.325	4.687
	(10.716)	(10.702)	(10.699)	(10.716)	(10.692)
N	3,285	3,285	3,285	3,285	3,285
F	25.76***	24.97***	25.07***	24.66***	23.22***
R (overall)	.206	.208	.209	.206	.211
R (within)	.184	.184	.179	.186	.179
R (between)	.226	.227	.222	.228	.223

*$p < .05$. **$p < .01$. ***$p < .001$ (one-tailed test for hypothesis testing, two-tailed test for others).

Model 4 shows that the interaction between executive hubris and environmental munificence was significantly negative ($p < .001$), supporting Hypothesis 2a. Model 5 included the interaction between executive hubris and environmental complexity. Consistent with Hypothesis 2b, the interaction was negative and significant ($p < .001$).

Model 6 included the interaction between executive hubris and environmental dynamism, but the term was not significant. To further explore this result, we conducted a split-sample analysis separating the high-dynamism group from the low-dynamism group. High dynamism

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

was defined as the top quartile of the values of environmental dynamism. The results showed that executive hubris was positive and significant ($p < .05$) in the low-dynamism subsample, but it was not significant in the high-dynamism subsample. This result provided some support for Hypothesis 2c that environmental dynamism weakens the effect of executive hubris. Model 7, as the full model, included all the variables, and the results generally remained.

Table 5 displays the fixed-effect estimates of the number of patent citations received as another indicator of firm innovation. Model 8 presents the results with the control variables, the moderating variables, and executive hubris included. Firm size was positively ($p < .01$) related to the number of patent citations received, while environmental munificence was negatively ($p < .001$) related. Executive hubris was found to be positively related to firm innovation, which was indicated by the number of patent citations ($p < .05$), again confirming Hypothesis 1. The results from Models 9 through 12 all render strong support to Hypotheses 2a and 2b ($p < .01$ in Model 9; $p < .05$ in Model 12). We again conducted a split-sample analysis for environmental dynamism, and the results rendered some support to Hypothesis 2c: The main effect was positive and significant ($p < .01$) only for the low-dynamism group.

Discussion

Studying hubris or overconfidence is important for strategic management, as "no problem in judgment and decision making is more prevalent and more potentially catastrophic than overconfidence" (Plous, 1993: 217). The existing efforts tend to emphasize the costs a hubristic executive brings to his or her firm (Hayward & Hambrick, 1997; Li & Tang, 2010; Malmendier & Tate, 2005). However, the field has recently called for more attention to be given to the potential benefits that executive hubris may generate (Bollaert & Petit, 2010; Galasso & Simcoe, 2011). Indeed, a recent article in *Nature* declared that "[hubris can be] advantageous because it serves to increase ambition, morale, resolve, persistence or the credibility of bluffing, generating a self-fulfilling prophecy in which exaggerated confidence actually increases the probability of success" (Johnson & Fowler, 2011: 317).

Joining the above discussion, the results from our two studies provide evidence that executive hubris leads to higher firm innovation. The effect of executive hubris is moderated by a few environmental factors: When certain environmental conditions (such as a less munificent or less complex environment) allow executives to focus their attention on the area of most interest to them (firm innovation, in our context), the main relationship becomes stronger.

This research is grounded in and contributes to the theoretical perspectives of the upper echelons theory and the firm innovation literature. It serves as one of the first empirical studies to explicitly test the relationship between executive hubris, an important managerial psychological bias, and firm innovation. Prior research affiliated with the upper echelons theory has paid considerable attention to the consequences of corporate executives' psychological biases for firm outcomes (Chatterjee & Hambrick, 2007; Li & Tang, 2010). The antecedents of firm innovation have also been well explored (for a review, see Rothaermel & Hess, 2007). Insightful as these two research streams have been, the explicit question of how top executives' psychological biases may influence this important firm-level outcome remains unanswered. Firm innovation has been considered a crucial mechanism through

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

which firms position themselves for the future (Van de Ven, 1986). The upper echelons theory has predicted that top executives' psychological characteristics are important determinants of firm behavior and outcomes (Hambrick, 2007; Hambrick & Mason, 1984). As executive hubris has been shown to influence firm-level decisions and outcomes significantly (Hayward & Hambrick, 1997; Li & Tang, 2010), as an exploratory effort, the present study extends both the upper echelons theory and the firm innovation research by establishing a direct link between the two.

This study also extends our knowledge of the consequences of executive hubris. The results complement previous findings that focused on the negative outcomes of executive hubris (Hayward & Hambrick, 1997; Malmendier & Tate, 2005). By identifying the conditions under which this cognitive bias may work to the advantage of firms in areas such as innovation, this study enriches the understanding of executive hubris. Aiming at this objective, this study integrates the upper echelons theory with the attention-based view of the firm. The attention-based view is an important theoretical perspective in strategic management research (Ocasio, 1997). Researchers have studied how the upper echelons theory and the attention-based view may work together to predict firm decisions and outcomes (Cho & Hambrick, 2006; Tuggle, Schnatterly, & Johnson, 2010), but such efforts have been scarce. In particular, whether and how the attention-based view might supplement research on senior executives' psychological biases have not been addressed. This study tries to fill this gap by presenting the theoretical arguments through the attention-based view and explaining the interplay between executive hubris and firm innovation.

Finally, our theoretical predictions are confirmed through regression analyses using cross-sectional and panel data, two indicators of executive hubris, multiple measures of firm innovation, and data obtained from firms in two cultural contexts (China and the United States). In particular, in Study 2, the context is high-tech industries, where firm innovation is the critical factor determining firm success. Our methodologies enhance the generalizability of our findings and ensure the robustness of our theoretical predictions.

Implications for Practice

The results of this study also have practical implications for corporate executives. It is important for executives to have confidence in what they do, and a moderate amount of optimism helps encourage them to achieve more than they might otherwise be able to (Hiller & Hambrick, 2005). The results confirm that a moderate amount of confidence, or even overconfidence, as an integral part of the discovery process, can be instrumental to firm innovation. Indeed, the field has recently made the distinction between authentic pride and hubristic pride as two facets of decision makers' psychological characteristics (Tracy & Robins, 2007). It is worth applying this distinction to the corporate executive context. Authentic pride can help project an executive's vision of his or her firm (Collins & Porras, 1994). However, when executives overreach and their egos are inflated, the resulting hubris can backfire.

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

Our results show that in some cases executive overconfidence will help firms attain the best results from their innovations. A good executive must tread a fine line between due optimism and outright bravado. Executives should examine their decisions and actions carefully to determine whether they reflect authentic confidence based on real data or hubris stemming from an inflated ego and excess pride (Hayward, 2007). Also, firms need to acknowledge the potential benefits their seemingly overoptimistic executives may bring to them, and firms should effectively guide their executives toward the direction that is most in line with their strategic priorities.

Reflections on Environmental Measures

There is a lot of room for strengthening our environmental measures in Study 2 through future efforts. Although we followed Dess and Beard's (1984) formulation, our measures of the three dimensions differ from the original operationalization in several important aspects. First of all, we adopted only one indicator for each dimension in the final analyses. Due to data availability, we were not able to utilize all the possible indicators, but we conducted some additional checks with alternative measures for environmental munificence and complexity, with consistent findings. This may provide some robustness evidence for our findings.

Second, we adopted a shorter time horizon. We assessed the environmental factors over 5-year intervals, whereas Dess and Beard (1984) used 10-year intervals. However, just as Castrogiovanni (2002: 138) pointed out, the use of shorter time intervals permitted assessment of our environmental variables over more data points within this study's time horizon, and 5-year intervals have been used in previous studies employing similar measures (Keats & Hitt, 1988; Li & Tang, 2010; Palmer & Wiseman, 1999).

Third, we measured three environmental variables in broader industry categories (three-digit instead of four-digit SIC). Different from Dess and Beard (1984), who studied a wider sample covering 52 manufacturing industries, our Study 2 focused on the high-tech industries. In the relevant literature, the categorization of high-tech industries has normally followed the three-digit convention (Cortright & Mayer, 2001; DeVol, 1999; Markusen et al., 1986). Also, due to data limitations, if we split the data according to four-digit SIC categories, the number of observations will be significantly skewed across different categories. For instance, there are only 8 observations in category 2833, while there are 1,029 observations in category 7372. This may generate additional methodological challenges. Therefore, in the current study, we chose to stick to three-digit SIC categories. Certainly, future research should broaden the analytical sample and analyze this topic through a more refined lens.

In addition, Sharfman and Dean (1991) pointed out that Dess and Beard's measures may have been based on a narrow conceptual framework. The formulation of environmental variables in the current study may suffer from such incompleteness. Future research should work to complement these environmental dimensions with more comprehensive operationalization. For instance, the environmental complexity measure in this study focused on the industry concentration (Palmer & Wiseman, 1999) but neglected the fact that complexity can result from product diversity or technical intricacy (Sharfman & Dean, 1991). As another example,

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

environmental dynamism should include technological instability in addition to market instability. In sum, the environmental variables should be assessed more comprehensively in future studies to corroborate the findings in this study.

Other Limitations and Future Research

Certain aspects of the results presented should also be interpreted in the light of their limitations. First, the operationalization of executive hubris used in both studies needs to be strengthened in future research. Previous research has relied on more distal proxies such as media praise or self-importance (Hayward & Hambrick, 1997; Malmendier & Tate, 2005). The current study relies instead on executives' subjective evaluations or forecasts of firm performance relative to the objective performance to measure executive hubris. We acknowledge that the appropriateness of these two measures is debatable. Management forecast errors may stem from multiple sources, with overconfidence being just one of them. Future research should consider more proximate measures. For example, researchers can ask CEOs directly about their (hyper) core self-evaluation (Hiller & Hambrick, 2005; Judge et al., 2002).

Second, although we referred to the attention-based view to explain the theoretical mechanism linking executive optimism and firm innovation performance, we did not directly and empirically assess the "attention mechanism." Future research should overcome this data limitation and measure managerial attention using more fine-grained measures. The literature has indeed provided certain guidance on measuring decision makers' attention allocation directly, for example, through content analysis (Cho & Hambrick, 2006; Tuggle et al., 2010). Future research should certainly consider these possibilities and try to confirm the theoretical propositions in this research.

Lastly, this research can certainly be improved by considering other important factors that can influence the mechanism linking executive hubris and firm innovation. Again due to data limitations, the current research considered only three salient environmental variables—environmental munificence, complexity, and dynamism. Indeed, Hambrick et al. (2005) proposed that executive job demands may moderate the effect corporate executives have on firms. This concept is particularly relevant here, as "those [executives] with lower job demands can take advantage of greater available time, attention, and other resources to be comprehensive in their analyses and search for solutions" (Hambrick et al., 2005: 479). In other words, when executives are facing greater job demands, the amount of attention they can allocate to one issue is limited. In the future, researchers should examine the role of executive job demands in the relationship between top executives' characteristics and firm behaviors and outcomes in a more comprehensive framework and perhaps in other contexts.

Notes

1. In 2001, manufacturing industries in China were classified into 30 categories (National Bureau of Statistics of China, 2001). The number of firms in each industry ranged from 13 to 274, with an average of 91 firms. The sampled firms had a return on sales of 7.18%, assets of US$65 million, and 1,818 employees on average. Detailed descriptive statistics are available from the authors.

2. Because many of the surveyed firms were not publicly listed and the survey conditions did not allow revealing the firms' identities, it was not feasible to use archival performance data at the firm level.

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

3. When the subjectively anchored evaluation was lower than the actual performance, we took it to mean the executive lacked confidence. In a robustness check, we recoded as *zero* any hubris score that was lower than zero, and the results were consistent.

4. The 10 dimensions include operation effectiveness, inventory, order for goods, sales, sale price, profitability, liquidity, sale growth, capital, and future investment.

References

Aiken, L. S., & West, S. G. 1991. *Multiple regression: Testing and interpreting interactions.* Thousand Oaks, CA: Sage.

Aldrich, H. 1979. *Organizations and environments.* Englewood Cliffs, NJ: Prentice Hall.

Anderson, P., & Tushman, M. 1990. Technological discontinuities and dominant designs: A cyclic model of technological change. *Administrative Science Quarterly,* 35: 604-633.

Barnett, M. 2008. An attention-based view of real options reasoning. *Academy of Management Review,* 33: 606-628.

Barnett, V., & Lewis, T. 1994. *Outliers in statistical data.* Chichester, UK: Wiley.

Barney, J. 1991. Firm resources and sustained competitive advantage. *Journal of Management,* 17: 99-120.

Begley, T., & Boyd, D. 1987. Psychological characteristics associated with performance in entrepreneurial firms and smaller businesses. *Journal of Business Venturing,* 2: 79-93.

Ben-David, I., Graham, J., & Harvey, C. 2006. *Managerial overconfidence and corporate policies.* NBER working paper no. 13711. National Bureau of Economic Research, Cambridge, MA.

Bergh, D., & Lawless, M. 1998. Portfolio restructuring and limits to hierarchical governance: The effects of environmental uncertainty and diversification strategy. *Organization Science,* 9: 87-102.

Bernardo, A., & Welch, I. 2001. On the evolution of overconfidence and entrepreneurs. *Journal of Economics and Management Strategy,* 10: 301-331.

Berson, Y., Oreg, S., & Dvir, T. 2008. CEO values, organizational culture and firm outcomes. *Journal of Organizational Behavior,* 29: 615-633.

Bollaert, H., & Petit, V. 2010. Beyond the dark side of executive psychology: Current research and new directions. *European Management Journal,* 28: 362-376.

Bourgeois, L. 1981. On the measurement of organizational slack. *Academy of Management Review,* 6: 29-39.

Bromiley, P. 1991. Testing a causal model of corporate risk taking and performance. *Academy of Management Journal,* 34: 37-59.

Brown, S., & Eisenhardt, K. 1995. Product development: Past research, present findings, and future directions. *Academy of Management Journal,* 20: 343-378.

Camerer, C., & Lovallo, D. 1999. Overconfidence and excess entry: An experimental approach. *American Economic Review,* 89: 306-318.

Castrogiovanni, G. 2002. Organization task environments: Have they changed fundamentally over time? *Journal of Management,* 28: 129-150.

Chatterjee, A., & Hambrick, D. 2007. It's all about me: Narcissistic chief executive officers and their effects on company strategy and performance. *Administrative Science Quarterly,* 52: 351-386.

Cho, T., & Hambrick, D. 2006. Attention as the mediator between top management team characteristics and strategic change: The case of airline deregulation. *Organization Science,* 17: 453-469.

Collins, J., & Porras, J. 1994. *Built to last: Successful habits of visionary companies.* New York: Harper Business.

Cortright, J., & Mayer, H. 2001. *High tech specialization: A comparison of high technology centers.* Washington, DC: Brookings Institution Center on Urban and Metropolitan Policy.

Coy, P. 2000. The creative economy. *Business Week,* 28 August: 77.

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

Cruz, C., Gomez-Mejia, L., & Becerra, M. 2010. Perceptions of benevolence and the design of agency contracts: CEO–TMT relationships in family firms. *Academy of Management Journal,* 53: 69-89.

Cyert, R., & March, J. 1963. *A behavioral theory of the firm.* Englewood Cliffs, NJ: Prentice Hall.

Daft, R. 1982. Bureaucratic versus nonbureaucratic structure and the process of innovation and change. In S. B. Bacharach (Ed.), *Research in the sociology of organizations* (Vol. 1): 129-166. Greenwich, CT: JAI Press.

Damanpour, F. 1991. Organizational innovation: A meta-analysis of effects of determinants and moderators. *Academy of Management Journal,* 34: 555-590.

Dess, G., & Beard, D. 1984. Dimensions of organizational task environments. *Administrative Science Quarterly,* 2: 52-73.

DeVol, R. 1999. *American's high-tech economy: Growth, development and risks for metropolitan areas*. Santa Monica, CA: Milken Institute.

Doty, D. H., & Glick, W. 1998. Common methods bias: Does common methods variance really bias results? *Organizational Research Methods,* 1: 374-406.

Edwards, J. 2002. Alternative to difference scores: Polynomial regression analysis and response surface methodology. In F. Drasgow & N. W. Schmitt (Eds.), *Advances in measurement and data analysis:* 350-400. San Francisco: Jossey-Bass.

Edwards, J., & Parry, M. 1993. On the use of polynomial regression equations as an alternative to difference scores in organizational research. *Academy of Management Journal,* 36: 1577-1613.

Finkelstein, S., & Boyd, B. 1998. How much does the CEO matter? The role of managerial discretion in the setting of CEO compensation. *Academy of Management Journal,* 41: 179-199.

Finkelstein, S., & Hambrick, D. C. 1996. Strategic leadership: Top executives and their effects on organizations. Minneapolis: West Educational Publishing.

Finkelstein, S., Hambrick, D., & Cannella, A. 2009. *Strategic leadership: Theory and research on executives, top management teams, and boards.* New York: Oxford University Press.

Galasso, A., & Simcoe, T. 2011. CEO overconfidence and innovation. *Management Science,* 57: 1469-1484.

Garcia, R., & Calantone, R. 2002. A critical look at technological innovation typology and innovativeness terminology: A literature review. *Journal of Product Innovation Management,* 19: 110-132.

Gong, G., Li, L., & Xie, H. 2009. The association between management earnings forecast errors and accruals. *Accounting Review,* 84: 497-530.

Greve, H. 2003. A behavioral theory of R&D expenditures and innovations: Evidence from shipbuilding. *Academy of Management Journal,* 46: 685-702.

Griffin, D., & Tversky, A. 1992. The weighing of evidence and the determinants of confidence. *Cognitive Psychology,* 24: 411-435.

Grimm, C., Lee, H., & Smith, K. 2006. *Strategy as action: Competitive dynamics and competitive advantage.* New York: Oxford University Press.

Hall, B., Jaffe, A., & Trajtenberg, M. 2001. *The NBER Patent Citations Data File: Lessons, insights and methodological tools.* NBER working paper no. 8498. National Bureau of Economic Research, Cambridge, MA.

Hambrick, D. 2007. Upper echelons theory: An update. *Academy of Management Review,* 32:334-343.

Hambrick, D., & Finkelstein, S. 1987. Managerial discretion: A bridge between polar views of organizational outcomes. In B. Staw & L. Cummings (Eds.), *Research in organizational behavior* (Vol. 9): 369-406. Greenwich, CT: JAI Press.

Hambrick, D., Finkelstein, S., & Mooney, A. 2005. Executive job demands: New insights for explaining strategic decisions and leader behaviors. *Academy of Management Review,* 30: 472-491.

Hambrick, D., & Mason, P. 1984. Upper echelons: The organization as a reflection of its top managers. *Academy of Management Review,* 9: 193-206.

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

Harhoff, D., Narin, F., Scherer, F. M., & Vopel, K. 1999. Citation frequency and the value of patented inventions. *Review of Economics and Statistics,* 81: 511-515.

Hausman, J. 1978. Specification tests in econometrics. *Econometrica,* 46: 1251-1271.

Hayward, M. 2007. *Ego check: Why executive hubris is wrecking companies and careers and how to avoid the trap.* New York: Kaplan Business.

Hayward, M., & Hambrick, D. 1997. Explaining the premiums paid for large acquisitions: Evidence of CEO hubris. *Administrative Science Quarterly,* 42: 103-127.

Hayward, M., Shepherd, D., & Griffin, D. 2006. A hubris theory of entrepreneurship. *Management Science,* 52: 160-172.

Hilary, G., & Menzly, L. 2006. Does past success lead analysts to become overconfident? *Management Science,* 52: 489-500.

Hiller, N., & Hambrick, D. 2005. Conceptualizing executive hubris: The role of (hyper-) core self-evaluations in strategic decision-making. *Strategic Management Journal,* 26: 297-319.

Hirshleifer, D., Low, A., & Teoh, S. 2010. *Are overconfident CEOs better innovators?* Working paper, University of California, Irvine.

Hmieleski, K., & Baron, R. 2009. Entrepreneurs' optimism and new venture performance: A social cognitive perspective. *Academy of management Journal,* 52: 473-488.

Johnson, D., & Fowler, J. 2011. The evolution of overconfidence. *Nature,* 477: 317-320.

Judge, T., Erez, A., Bono, J., & Thoresen, C. 2002. Are measures of self-esteem, neuroticism, locus of control, and generalized self-efficacy indicators of a common core construct? *Journal of Personality and Social Psychology,* 83: 693-710.

Judge, T., Locke, E., & Durham, C. 1997. The dispositional causes of job satisfaction: A core evaluations approach. In B. Staw & L. Cummings (Eds.), *Research in organizational behavior* (Vol. 19): 151-188. Greenwich, CT: JAI Press.

Kahneman, D., & Tversky, A. 1995. Conflict resolution: A cognitive perspective. In K. Arrows, R. Mnookin, L. Ross, A. Tversky, & R. Wilson (Eds.), *Barriers to conflict resolution:* 44-61. New York: Norton.

Keats, B., & Hitt, M. 1988. A causal model of linkages among environmental dimensions, macro organizational characteristics, and performance. *Academy of Management Journal,* 31: 570-598.

Kennedy, P. 2008. *A guide to econometrics* (6th ed.). Hoboken, NJ: Wiley-Blackwell.

Kennedy, D., Lakonishok, J., & Shaw, W. 1992. Accommodating outliers and nonlinearity in decision models: Professional adaptation. *Journal of Accounting, Auditing and Finance,* 7: 161-194.

Klayman, J., Soll, J., Gonzalez-Vallejo, C., & Barlas, S. 1999. Overconfidence: It depends on how, what, and whom you ask. *Organizational Behavior and Human Decision Processes,* 79: 216-247.

Konar, S., & Cohen, M. 2001. Does the market value environmental performance? *Review of Economics and Statistics,* 83: 281-289.

Krishnan, R., Martin, X., & Noorderhaven, N. 2006. When does trust matter to alliance performance? *Academy of Management Journal,* 49: 894-917.

Laursen, K., & Salter, A. 2006. Open for innovation: The role of openness in explaining innovation performance among U.K. manufacturing firms. *Strategic Management Journal,* 27**:** 131-150.

Leary, W. E. 2002. Secrets of 200 years of inventions in the most innovative country. *New York Times Online*, 6 November.

Li, J., & Tang, Y. 2010. CEO hubris and firm risk taking in China: The moderating role of managerial discretion. *Academy of Management Journal,* 53: 45-68.

Lichtenthaler, U. 2009. Absorptive capacity, environmental turbulence, and the complementarity of organizational learning processes. *Academy of Management Journal,* 52: 822-846.

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

Lowe, R., & Ziedonis, A. 2006. Overoptimism and the performance of entrepreneurial firms. *Management Science,* 52: 173-186.

Makri, M., Lane, P., & Gomez-Mejia, L. 2006. CEO incentives, innovation, and performance in technology-intensive firms: A reconciliation of outcome and behavior-based incentive schemes. *Strategic Management Journal,* 27: 1057-1080.

Malmendier, U., & Tate, G. 2005. CEO overconfidence and corporate investment. *Journal of Finance,* 60: 2661-2700.

Malmendier, U., & Tate, G. 2008. Who makes acquisitions? CEO overconfidence and the market's reaction. *Journal of Financial Economics,* 89: 20-43.

March, J. 1991. Exploration and exploitation in organizational learning. *Organization Science,* 2: 71-87.

Markusen, A., Hall, P., & Glasmeier, A. 1986. *High tech America: The what, how, where, and why of the Sunrise Industries.* Boston: Allen & Unwin.

Miller, D., Fern, M., & Cardinal, L. 2007. The use of knowledge for technological innovation within diversified firms. *Academy of Management Journal,* 50: 308-326.

Miller, D., Kets de Vries, M., & Toulouse, J. 1982. Top executive locus of control and its relationship to strategy-making, structure, and environment. *Academy of Management Journal,* 25: 237-253.

Miller, D., & Toulouse, J. 1986. Chief executive personality and corporate strategy and structure in small firms. *Management Science,* 32: 1389-1409.

Moore, D., & Healy, P. 2008. The trouble with overconfidence. *Psychological Review,* 115: 502-517.

National Bureau of Statistics of China. 2001. *China statistical yearbook* (Vol. 20). Beijing: China Statistics Press.

Palmer, T., & Wiseman, R. 1999. Decoupling risk taking from income stream uncertainty: A holistic model of risk. *Strategic Management Journal,* 20: 1037-1062.

Plous, S. 1993. *The psychology of judgment and decision making.* New York: McGraw-Hill.

Ocasio, W. 1997. Towards an attention-based view of the firm. *Strategic Management Journal,* 18: 187-206.

Peng, L., & Xiong, W. 2006. Investor attention, overconfidence and category learning. *Journal of Financial Economics,* 80: 563-602.

Rothaermel, F., & Hess, A. 2007. Building dynamic capabilities: Innovation driven by individual-, firm-, and network-level effects. *Organization Science,* 18: 898-921.

Rotter, J. 1966. Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General and Applied,* 80(1): 1-28.

Saxenian, A. 1994. *Regional advantage: Culture and competition in Silicon Valley and Route 128.* Cambridge, MA: Harvard University Press.

Sharfman, M., & Dean, J. 1991. Conceptualizing and measuring the organizational environment: A multidimensional approach. *Journal of Management,* 17: 681-700.

Simon, M., & Houghton, S. 2003. The relationship between overconfidence and the introduction of risky products: Evidence from a field study. *Academy of Management Journal,* 46: 139-149.

Simsek, Z., Heavey, C., & Veiga, J. 2010. The impact of CEO core self-evaluation on the firm's entrepreneurial orientation. *Strategic Management Journal,* 31: 110-119.

Singh, J. 1986. Performance, slack, and risk taking in organizational decision making. *Academy of Management Journal,* 29: 562-585.

Song, M., Dyer, B., & Thieme, R. 2006. Conflict management and innovation performance: An integrated contingency perspective. *Journal of the Academy of Marketing Science,* 34: 341-356.

Souder, D., Simsek, Z., & Johnson, S. 2012. The differing effects of agent and founder CEOs on the firm's market expansion. *Strategic Management Journal,* 33: 23-41.

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015

Tracy, J., & Robins, R. 2007. The psychological structure of pride: A tale of two facets. *Journal of Personality and Social Psychology,* 92: 506-525.

Tuggle, C., Schnatterly, K., & Johnson, R. 2010. Attention patterns in the boardroom: How board composition and processes affect discussion of entrepreneurial issues. *Academy of Management Journal,* 53: 550-571.

Van de Ven, A. 1986. Central problems in the management of innovation. *Management Science,* 32: 590-607.

Wadhwa, A., & Kotha, S. 2006. Knowledge creation through external venturing: Evidence from the telecommunications equipment manufacturing industry. *Academy of Management Journal,* 49: 819-835.

Wang, H., & Li, J. 2008. Untangling the effects of overexploration and overexploitation on organizational performance: The moderating role of environmental dynamism. *Journal of Management,* 34: 925-951.

Wang, H., & Qian, C. 2011. Corporate philanthropy and corporate financial performance: The role of stakeholder response and political access. *Academy of Management Journal,* 54: 1159-1181.

Westley, F., & Mintzberg, H. 1989. Visionary leadership and strategic management. *Strategic Management Journal,* 10: 17-32.

Wiersema, M., & Bantel, K. 1993. Top management team turnover as an adaptation mechanism: The role of the environment. *Strategic Management Journal,* 14: 485-504.

Wooldridge, J. 2002. *Econometric analysis of cross section and panel data*. Cambridge, MA: MIT Press.

Yadav, M., Prabhu, J., & Chandy, R. 2007. Managing the future: CEO attention and innovation outcomes. *Journal of Marketing,* 71: 84-101.

Yang, H., Phelps, C., & Steensma, K. 2010. Learning from what others have learned from you: The effects of knowledge spillover on originating firms. *Academy of Management Journal,* 53: 371-389.

Young, G., Charns, M., & Shortell, S. 2001. Top manager and network effects on the adoption of innovative management practices: A study of TQM in a public hospital system. *Strategic Management Journal,* 22: 935-951.

Downloaded from jom.sagepub.com at CHONNAM NATIONAL UNIV LIBRARY on July 29, 2015