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WHEN DOES ENTREPRENEURIAL SELF-EFFICACY ENHANCE VERSUS REDUCE FIRM PERFORMANCE?

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The entrepreneurial self-efficacy of lead founders has been generally considered to be a robust predictor of the performance of their firms. Few studies, however, have considered variables that might moderate this relationship. The current study attempts to fill this gap in the literature by examining two possible moderators of the effects of entrepreneurial self-efficacy on firm performance: dispositional optimism and environmental dynamism. Results indicate that these factors do indeed moderate the effects of entrepreneurial self-efficacy; in fact, a three-way interaction between self-efficacy, optimism, and environmental dynamism was observed with respect to firm performance. Consistent with predictions, in dynamic environments, the effects of high entrepreneurial self-efficacy on firm performance were positive when combined with moderate optimism, but negative when combined with high optimism. In stable environments, in contrast, the effects of self-efficacy were relatively weak, and were not moderated by optimism. Overall, results suggest that high self-efficacy is not always beneficial for entrepreneurs and may, in fact, exert negative effects under some conditions. Copyright © 2008 Strategic Management Society.

INTRODUCTION

Entrepreneurial self-efficacy (ESE) is the degree to which people perceive themselves as having the ability to successfully perform the various roles and tasks of entrepreneurship (Chen, Greene, and Crick, 1998; De Noble, Jung, and Ehrlich, 1999). Without minimal levels of entrepreneurial self-efficacy, it is unlikely that potential entrepreneurs would be sufficiently motivated to engage in the new venture creation process (Boyd and Vozikis, 1994; Krueger and Brazeal, 1994; Markman, Balkin, and Baron, 2002; Zhao, Seibert, and Hills, 2005). Further, many studies have demonstrated the significant benefits that often accrue to those high in self-efficacy (Judge and Bono, 2001; Stajkovic and Luthans, 1998). For example, individuals high in self-efficacy tend to set challenging goals; persist toward the achievement of their goals, even under difficult and stressful circumstances; and recover quickly from failure, even in the face of adverse conditions (Bandura, 1997). These benefits are likely to be particularly advantageous in the context of new venture creation, which is characterized by information overload, high uncertainty, and high time pressure (Baron, 1998). To this end, it is not surprising that entrepreneurs high in entrepreneurial self-efficacy have been found to be higher in work satisfaction (Bradley and Roberts, 2004) and lead their firms to higher levels of revenue and employment growth (Baum and Locke, 2004; Baum, Locke, and Smith, 2001) than those comparatively lower in entrepreneurial self-efficacy.

Keywords: cognition; entrepreneurial hubris; environmental uncertainty; high growth; overconfidence
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But is it possible that there are circumstances in which entrepreneurial self-efficacy may exert negative as well as positive effects? Recently, scholars have suggested that extreme levels of confidence may manifest as *hubris* (excessive pride or arrogance) on the part of entrepreneurs and undermine their ability to effectively lead their firms (Hayward, Shepherd, and Griffin, 2006). To date, however, this issue has received little empirical consideration within the entrepreneurship literature. In contrast, discussions of the potential negative effects of high self-efficacy have begun to appear in the literature of other fields of management, such as organizational behavior (e.g., Vancouver *et al.*, 2002; Vancouver, Thompson, and Williams, 2001) and strategic management (e.g., Hayward and Hambrick, 1997; Hiller and Hambrick, 2005). These recent discussions regarding the potential negative effects of self-efficacy led us to consider whether *more is always better* with respect to entrepreneurial self-efficacy, and motivated us to undertake the current study.

To this end, we investigate the potential moderating effects of two variables—dispositional optimism and environmental dynamism—on the link between the entrepreneurial self-efficacy of lead entrepreneurs (i.e., individuals who are both founder *and* chief executive officer of their firms) and the performance of their firms. Dispositional optimism is defined as generalized positive outcome expectancy (Carver and Sheier, 2003). While self-efficacy has been established as an individual characteristic that tends to be context specific and developed through life experience (Bandura, 1977; 1997), optimism has been shown to remain relatively stable within individuals across both time and context (Carver and Sheier, 2003; Schulman, Keith, and Seligman, 1993). Self-efficacy and optimism have been theoretically and empirically shown to be independent constructs (Luthans and Youssef, 2004). The primary difference between these constructs is that self-efficacy is related to positive self-evaluations of competency (the capacity or ability to perform specific tasks well), whereas optimism relates to positive outcome expectancies. Individuals high in self-efficacy believe that they can perform specific tasks they undertake well, but might not necessarily expect to receive positive outcomes from their efforts. This would be especially true for those who are high in self-efficacy, but only moderate in optimism. Further, individuals high in optimism may expect positive outcomes to result, even when lacking confidence in their own ability—anticipating that external factors (e.g., fate, chance) will intervene on their behalf. Therefore, we consider optimism as a potential moderator of the effects of entrepreneurial self-efficacy since it can lead individuals to overestimate the probability that their efforts will result in positive outcomes—a particularly dangerous cognitive bias for entrepreneurs, because overconfidence can cause them to assume unnecessary risks that jeopardize the survival of their firms (Lovallo and Kahneman, 2003).

A second potential moderator of the link between entrepreneurs' self-efficacy and firm performance is environmental dynamism. We believe that this factor, too, may exert important effects because past research suggests that overconfidence, such as that which may result from the combination of high entrepreneurial self-efficacy and optimism, is largely context dependent (Soll, 1996). This is consistent with Bandura's (1986) arguments that the effects of self-efficacy are likely to be contingent on key contextual variables. Environmental dynamism refers to the rate of unpredicted change occurring within a given industry (Dess and Beard, 1984; Duncan, 1972). Therefore, environmental dynamism relates to the quality and availability of information essential for strategic decision making. Decision options within dynamic environments tend to be more ambiguous, increasing the potential for overconfidence to operate, and for the occurrence of errors in judgment and decision making (Klayman *et al.*, 1999). In contrast, underconfidence can sometimes occur in stable environments, where decision options are more certain (Soll, 1996). On the basis of these considerations, we reason that dispositional optimism will be more likely to encourage overconfidence among entrepreneurs high in self-efficacy in dynamic environments than in more stable industry environments.

Since a primary goal of the present research is linking individual-level variables (i.e., self-efficacy, dispositional optimism) to firm-level measures, we evaluate firm performance in terms of two measures that have been widely used in previous research (e.g., Baum *et al.*, 2001; Baum and Locke, 2004; Ensley, Hmieleski, and Pearce, 2006): revenue growth and employment growth. Although entrepreneurs are likely to have a wide variety of goals, it has been suggested that the achievement of high growth is the principal goal distinguishing entrepreneurs from small business owners (Carland *et al.*, 1984). Following the logic of Hambrick and Finkelstein (1987) and Baum and Locke (2004), we believe that the performance of relatively young firms can be viewed

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as a direct reflection of the decision making of lead entrepreneurs, who have ultimate managerial discretion over the actions of their firms. Further, we focus on the behavior of the lead entrepreneur due to evidence suggesting that, although firms are often formed by founding teams, one individual typically emerges as the leader (Ensley, Carland, and Carland, 2000) and has an inordinate impact on the vision and strategic direction of the firm (Baum, Locke, and Kirkpatrick, 1998; Hmieleski and Ensley, 2007). As Baron (2007) suggests, these individuals are, indeed, the *active element* in the new venture creation and development process.

Through the current study, we hope to demonstrate the potential benefits of a contextual view of the effects of entrepreneurial self-efficacy on firm performance—a view that considers the complex interaction between individual-level variables and the environmental contexts in which entrepreneurs lead their firms. This perspective is fully consistent with the multi-level approach recommended so cogently by Hitt *et al.* (2007). By adopting this perspective, we hope to provide new insights into the question of why some individuals are much more successful than others in launching and growing new businesses.

With this goal in mind, the paper proceeds as follows. First, we briefly review the literature on entrepreneurial self-efficacy and dispositional optimism. Next, we describe how these variables interact to influence the judgment and decision making of entrepreneurs. Third, we explain why this interaction is likely to exhibit differential effects on performance within dynamic versus stable industry environments. Fourth, we outline the methodology of the study and review the results. Finally, we consider the implications of our findings.

THEORETICAL DEVELOPMENT

Entrepreneurial self-efficacy

Within the entrepreneurship literature, there has been a great deal of research designed to investigate the effects of self-efficacy. Much of this work has explored the linkage between self-efficacy and individuals' intentions to start new businesses. For example, Chen *et al.* (1998) developed a scale to measure individuals' confidence in their ability to perform tasks relating to marketing, innovation, management, risk taking, and financial control, and found participants' ratings on these dimensions to be positively related to their intentions to embark in the process of new venture creation. Similarly, De Noble *et al.* (1999) developed a scale of entrepreneurial self-efficacy that considers individuals' confidence in their ability to develop new product and market opportunities, build an innovative environment, initiate investor relationships, define core purpose, cope with unexpected challenges, and develop critical human resources. Similar to the results of Chen *et al.* (1998), these authors found participants' ratings on their measure to be positively related to individuals' intentions of starting a new business.

Additional studies have demonstrated that entrepreneurs tend to be higher in self-efficacy than other persons. For example, research by Markman *et al.* (2002) found patent inventors actively involved in the formation of a new business to have higher levels of self-efficacy than patent inventors who had decided not to start a new business. Similar results were observed in a subsequent study by these authors (Markman, Baron, and Balkin, 2005). These findings support previous arguments that self-efficacy might be an important mechanism for overcoming perceptions of risk that are often associated with new venture creation (Boyd and Vozikis, 1994; Hmieleski and Corbett, 2006; Kolvereid, 1996; Krueger and Brazeal, 1994; Krueger, Reilly, and Carsrud, 2000). This logic has been used to explain the fact that males are more likely to become entrepreneurs than females: they are, on average, more confident in their abilities to perform at high levels in the roles and tasks of entrepreneurship (Kourilsky and Walstad, 1998; Mueller, 2004). In further support of this reasoning, research by Zhao *et al.* (2005) found entrepreneurial self-efficacy to mediate the effects of perceptions of formal learning, entrepreneurial experience, risk propensity, and gender on intentions to start a new business.

Self-efficacy has also been found to have important effects on other entrepreneurial-related outcomes. For example, Bradley and Roberts (2004) found self-efficacy to be positively related to the work satisfaction of entrepreneurs. Similarly, Cooper and Artz (1995) found that the higher the confidence of entrepreneurs in their ability to develop and grow their new ventures, the greater their satisfaction, regardless of the actual performance of their firms. The results of these studies indicate that self-efficacy may help mitigate some of the stress associated with being an entrepreneur. Other research by Forbes (2005a) found the level of entrepreneurs' self-efficacy to significantly predict the extent to

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which their firms engaged in comprehensive decision making. This finding suggests that entrepreneurs who are confident in their abilities tend to lead their firms toward the development of comprehensive strategic plans, whereas those less confident in their abilities tend to be less apt to put forth the effort to do so. Further, studies by Baum *et al.* (2001), Baum and Locke (2004), and Hmieleski and Corbett (2008) have identified a positive relationship between the self-efficacy of entrepreneurs and the growth of their firms. Similarly, Forbes (2005b) and Anna *et al.* (2000) have found a positive relationship between entrepreneurial self-efficacy and subjective measures of new venture performance. The findings of these studies suggest that entrepreneurs high in self-efficacy are likely to set challenging growth expectations for their firms and persist in their leadership efforts toward the accomplishment of those goals.

In sum, it appears that entrepreneurs are, on average, higher than others in self-efficacy, and that entrepreneurs high in self-efficacy tend to be higher performing. They are higher performing in that the firms they lead tend to grow more quickly and be more profitable than those led by entrepreneurs who are comparatively lower in entrepreneurial self-efficacy. In the next section, we discuss the role of dispositional optimism within the entrepreneurship context.

Optimism

The literature on optimism among entrepreneurs has provided strong support for concluding that entrepreneurs also tend to be, on average, more optimistic than other persons. For example, a study by Cooper, Woo, and Dunkelberg (1988) found extreme optimism to be pervasive among entrepreneurs. The authors identified no significant difference in the degree of optimism that entrepreneurs exhibited toward the success of their businesses, regardless of their individual level of preparedness to lead their firms. Several other researchers have also pointed out the pervasiveness of optimism among entrepreneurs, suggesting that entrepreneurship may attract a disproportionate number of optimistic individuals (e.g., Abdelsamad and Kindling, 1978; Lovallo and Kahneman, 2003). De Meza and Southey (1996) account for the occurrence of this phenomenon by arguing that many individuals starting new businesses have little evidence upon which to base their beliefs about the likelihood of failure or success, and that this creates a situation that encourages unrealistic optimism.

Others have considered cognitive aspects related to the high levels of optimism often observed among entrepreneurs. For example, Busenitz and Barney (1997) suggest that entrepreneurs may be more susceptible to the use of certain decision-making biases and heuristics that tend to slant their judgments in a positive direction. Specifically, the results of their research indicate that entrepreneurs tend to overestimate the probability of being right and overgeneralize from a few characteristics or observations significantly more so than managers of large, established organizations. These results support Palich and Bagby's (1995) proposition that entrepreneurs are predisposed to cognitively categorize business situations positively. In further support of this perspective, Simon, Houghton, and Aquino (1999) found entrepreneurs to be poor at estimating the limits of their knowledge. As such, they describe entrepreneurs as having the tendency to rely heavily on the following biases: (1) the illusion of control—overemphasizing the extent to which their skills can improve performance in situations where chance plays a large part and skill is not necessarily a deciding factor; and (2) the belief in the law of small numbers—the use of a limited number of information inputs (i.e., a small sample of information) to draw conclusions.

Under uncertain environmental conditions, cognitive biases and heuristics such as the ones mentioned here can be useful guides for decision making. In such settings, comprehensive and cautious decision making might not be possible, and biases and heuristics may offer a useful alternative to formulated planning (Corbett and Hmieleski, 2007). It is also possible, however, for biases and heuristics to lead to serious errors in judgment and decision making. Such errors seem especially likely to occur among entrepreneurs who lead their firms within dynamic industries. In such environments, current conditions change rapidly and as a result, are unlikely to mirror the context in which existing biases and heuristics were initially formed. For example, the illusion of control is likely to be particularly problematic in dynamic industry environments. In this context, chance is likely to play a larger role in outcomes, as compared to its role in more stable industry environments.

In sum, entrepreneurs tend to be, on average, more optimistic than other individuals. This is not surprising considering that even the most conservative

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estimates report that at least half of all new businesses fail within the first four years of their establishment (Headd, 2001) and, therefore, only relatively optimistic individuals would choose to pursue this activity. Further, the high level of optimism exhibited by entrepreneurs appears to enhance their reliance on heuristic thinking, which may result in both positive and negative outcomes.

Next, we review how environmental dynamism is likely to moderate the effects of entrepreneurial self-efficacy and dispositional optimism on firm performance.

The moderating effects of environmental dynamism

Dynamic industry environments pose both opportunity and challenge for entrepreneurs. It has been suggested that environmental dynamism provides a fertile context in which entrepreneurial opportunities can arise (Shane and Venkataraman, 2000). For example, economists have argued that entrepreneurial opportunity emerges from information asymmetries, which are most likely to exist in dynamic industries (Hayek, 1945). Under such environmental conditions, entrepreneurs are able to profit from discrepancies in knowledge between buyers and sellers (Kirzner, 1997). Although dynamic environments may provide great opportunity, such environments also pose difficult challenges. Due to high levels of uncertainty, individuals working in dynamic environments often suffer from heavy information processing burdens (Tushman, 1979) and as a result, tend to experience high levels of distress and anxiety (Markman *et al.*, 2005). Entrepreneurial self-efficacy and dispositional optimism can help reduce such effects (Luthans and Youssef, 2004). However, the same combination may also lead to overconfidence. This is an important concern due to findings suggesting that overconfidence can give rise to *hubris*, causing executives to engage in unnecessary risk taking, adopt unrealistic initiatives, and engage in acts of intimidation toward subordinates or others (Hiller and Hambrick, 2005). An example of such negative effects is provided by Hayward and Hambrick (1997), who found that firms with CEOs suffering from hubris were more likely to acquire other businesses for excessive premiums, as compared to firms led by less arrogant CEOs. Kroll, Toombs, and Wright (2000) explain why such actions are common among executives by arguing that hubris can result in a drive to dominate others and engage in empire building for its own sake. Similarly, Kets de Vries and Miller (1984) have made the case that CEOs' belief in their ability to produce positive outcomes can often lead them to experience delusions of grandeur.

Such excessive levels of overconfidence can cause executives to stubbornly stick to behaviors that have worked well for them in the past, while undervaluing new or dissenting information (Kroll *et al.*, 2000). This type of behavior may be especially detrimental when exhibited in novel contexts that do not mirror the environment in which such routines were initially developed and found to be useful. For example, research by Klayman *et al.* (1999) has demonstrated that overconfidence is most likely to occur when decision options are ambiguous (e.g., as in dynamic environments) versus clear (e.g., as in stable environments). For this reason, we suggest that within dynamic environments, high dispositional optimism may cause entrepreneurs who are also high in entrepreneurial self-efficacy to become overconfident that their abilities will enable them to achieve positive outcomes. To this end, we suspect that entrepreneurs who are high both in self-efficacy and optimism may apply less effort toward acquiring additional information with which to make sense of their environment. As a result, these entrepreneurs may tend to engage in unwarranted risk taking. Recall that when we refer to highly optimistic entrepreneurs, we are talking about extreme levels of optimism in relation to the general population, since pessimists tend not to start new ventures and, therefore, entrepreneurs, as a group, are relatively high in dispositional optimism (Abdelsamad and Kindling, 1978; Cooper *et al.*, 1988; de Meza and Southey, 1996).

In contrast, we expect entrepreneurs who show more moderate levels of optimism, but who are high in entrepreneurial self-efficacy, will set more realistic expectations regarding the linkage between their ability and potential for achieving successful outcomes. Therefore, within dynamic environments, entrepreneurs who are high in self-efficacy but only moderately optimistic, should be more apt to consider dissenting views, seek external information to help make sense of their environment, and tailor their firms' strategic plans to the changing environment. On the basis of this reasoning, we offer the following hypothesis:

Hypothesis 1: In dynamic industry environments, the effects of entrepreneurial self-efficacy on firm

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performance will be more positive for entrepreneurs who are moderate, rather than high, in dispositional optimism.

In stable environments, where decision options are more certain due to higher levels of transparency and predictability, overconfidence is less likely to occur (Klayman *et al.*, 1999). In fact, in such a context, underconfidence is sometimes experienced (Soll, 1996). Here we expect that highly optimistic entrepreneurs who are also high in entrepreneurial self-efficacy will be more successful. This is because the environment is more likely to be in alignment with their past experience, thus reducing the need to consider various decision options in detail. Therefore, they should be able to draw on their confidence in their abilities to move forward to make quick decisions with less negative consequences, because decision alternatives will be more transparent to them in stable—as compared to dynamic—environments. This reasoning suggests the following hypothesis:

Hypothesis 2: In stable industry environments, the effects of entrepreneurial self-efficacy on firm performance will be more positive for entrepreneurs who are high, rather than moderate, in dispositional optimism.

In sum, we expect the positive effects of entrepreneurial self-efficacy on new venture performance to be enhanced by moderate optimism, but reduced by high optimism in dynamic environments—a context in which overconfidence tends to be commonplace. In contrast, we anticipate that the positive effects of entrepreneurial self-efficacy on new venture performance will be enhanced by high levels of optimism in stable environments—a context in which overconfidence is less common and underconfidence sometimes occurs. In the following section, we outline the methodology used to examine these hypothesized relationships.

METHODOLOGY

Sample and procedure

A national random sample of 1,000 firms was drawn from the Dun and Bradstreet Market Identifiers Database. The criteria were that the firms have been in existence for between three to 12 years and led by a chief executive officer who is a founder of the firm. Dun and Bradstreet compiles what is considered to be the most exhaustive database of young firms founded in the United States (Kalleberg *et al.*, 1990). Dun and Bradstreet provided the names and address of the firms and their chief executive officers. A packet containing our survey, along with a cover letter and pre-paid business reply envelope was sent to the chief executive officer of each firm. An initial and one follow-up mailing were sent. The first mailing resulted in 115 responses and the follow-up mailing provided 44 additional completed surveys, for a total sample size of 159. In total, 178 of the mailings were returned as non-deliverable. This resulted in a total response rate of 19.3 percent, which is in alignment with other studies using similar samples of top management (e.g., DeTienne and Koberg, 2002; Neck, Meyer, Cohen, and Corbett, 2004). Nonresponse bias was examined using *t* tests on firm age, revenue, number of employees, firm growth, and gender of the chief executive officer. In each case, the results were non-significant. Therefore, the final group of respondents appears to be representative of the population in which the sample was drawn.

The participants, who were both founders *and* chief executive officers of their firms, included 133 males and 26 females, with an averaged age of 52 years (SD = 9.74). The ethnic composition of the sample was primarily Caucasian (n = 148). The highest educational degree earned by participants included high school (n = 31), associate (n = 12), bachelor (n = 67), masters (n = 34), and doctoral (n = 15). Finally, the location of participants' firms ranged across 40 states, with primary operations in 105 different industries (as classified by four-digit Standard Industrial Classification codes).

Measures

Entrepreneurial self-efficacy. This construct was measured using an instrument designed by De Noble *et al.* (1999). The measure comprises 23 items requiring participants to rate their perceived ability to perform well on various behaviors (e.g., developing new product and market opportunities, building an innovative environment, initiating investor relationships, defining core purpose, coping with unexpected challenges, and developing critical human resources) that have been established within the literature as being robust predictors of entrepreneurial performance (Chandler and Jansen, 1992). Respondents rated their level of agreement with each item

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using a seven-point Likert-type scale ranging from (1) strongly disagree to (7) strongly agree. These scores were summed to form an overall measure of entrepreneurial self-efficacy. The higher the overall score, the greater the individual's belief in his/her ability to successfully perform important entrepreneurship-related tasks. For the full scale, the mean inter-item correlation was 0.31 and Cronbach's coefficient alpha was 0.92.

Optimism. Optimism was measured using Scheier, Carver, and Bridges' (1994) Life Orientation Test-Revised (LOT-R). The instrument is comprised of six items requiring respondents to indicate the extent of their agreement with each item using a seven-point Likert-type scale anchored by (1) strongly disagree and (7) strongly agree. The responses were summed to form an overall score of optimism. Thus, high scores indicate a generalized feeling of optimism toward the future. The mean inter-item correlation was 0.42 and Cronbach's coefficient alpha was 0.80.

To evaluate the extent to which the entrepreneurial self-efficacy and optimism scales measured two distinct constructs, we conducted a two-factor confirmatory analysis using AMOS 6.0. The chi-square for the model was nonsignificant ($\chi^2 = 97.69$, $p = 0.79$) and results from absolute fit (GFI = 0.96; standardized RMR = 0.02), parsimony fit (RMSEA = 0.01), and relative fit (CFI = 0.99) indices each demonstrated good fit. As a test of discriminant validity, we compared the chi-square value of a model allowing the covariance of the correlation between the constructs to be unconstrained to a model constraining the covariance to 1. The chi-square value for the constrained model was significantly higher ($\Delta\chi^2 = 46.9$, $p < 0.01$), indicating that the unconstrained model is a better fit and, thus, demonstrating discriminant validity. These findings suggest that the scales do, indeed, measure two distinct constructs.

Environmental dynamism. The industry-level rate of unpredicted change was measured following techniques from Dess and Beard (1984) and Sharfman and Dean (1991). Time was regressed against industry revenues, number of industry establishments, number of industry employees, and industry R&D intensity over the most recent 10-year period. An index of the standard errors of the regression was used as the indicator of unpredicted change. Data on industry revenues, industry establishment, and industry employment totals were acquired through the U.S. Bureau of the Census. R&D intensity data were acquired from the U.S. Patent Office.

Firm performance. Growth is often cited as the most important performance indicator of success for entrepreneurs (Brush and Vanderwerf, 1992). Consistent with this perspective, we used two different objective measures of growth: revenue growth and employment growth. We obtained revenue and employment totals from Dun and Bradstreet at two different points in time. The first was during the fall of 2004, when the questionnaire was administered. The second was in the fall of 2006, two years after the questionnaire had been administered. Average annual percent revenue growth for this two-year period was calculated as one-half the difference between 2004 and 2006 revenues, divided by the base year (2004) revenue. Employment growth was calculated using the same procedure. We formed an overall index of firm performance by standardizing and then summing revenue and employment growth. This allowed for a more parsimonious presentation of the results. Considering the high correlation between revenue and employment growth ($R = 0.60$, $p < 0.01$) in conjunction with the fact that we observed similar results when testing our hypotheses using these variable as separate performance indicators, this approach seemed warranted. Recent studies have confirmed the accuracy of Dun and Bradstreet firm performance data and have used similar methods to calculate firm growth (Baum *et al.*, 2001; Baum and Locke, 2004).

Control variables. Following previous research measuring firm growth, firm age along with revenue and employment totals for the year in which the survey data were collected were used as control variables (Keats and Hitt, 1988; McGuire, Schneeweis, and Hill, 1986). The data for each of these control variables were acquired through Dun and Bradstreet. In addition, gender and entrepreneurial experience were used as control variables. Gender was coded as '0' for male and '1' for female. Entrepreneurial experience was measured in terms of the number of previous ventures founded. Each of these items was asked on the administered survey.

Statistical procedures

Moderated hierarchical regression analysis was utilized as the main statistical procedure for examining the interaction of entrepreneurial self-efficacy × optimism × environmental dynamism on firm performance. Gender, entrepreneurial experience, firm age, revenue, and total number of employees were entered into step 1; entrepreneurial self-

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efficacy, optimism, and environmental dynamism were entered into step 2; the two-way interactions of entrepreneurial self-efficacy × optimism, entrepreneurial self-efficacy × environmental dynamism, and optimism × environmental dynamism were entered into step 3; and the three-way interaction of entrepreneurial self-efficacy × optimism × environmental dynamism was entered into step 4. In addition, the three-way interaction was graphed and the difference between the slopes was tested following procedures set forth by Dawson and Richter (2006).

RESULTS

Table 1 provides the means, standard deviations, and bivariate correlations for all of the variables measured in the study. The results of the hierarchical moderated regression model for firm performance are displayed in Table 2. The three-way interaction of entrepreneurial self-efficacy × optimism × dynamism is illustrated in Figure 1. The results of slope difference tests for the three-way interaction are shown in Table 3.

Multiple analyses were conducted to investigate the threat of multicollinearity and for potential outliers. In terms of examining the threat of multicollinearity, the highest correlation between any pair of independent variables was 0.70 (see Table 1) and no variance inflation scores were greater than 2.17. These tests show multicollinearity is not a concern, as each of these results falls well within acceptable ranges (Fox, 1997; Neter *et al.*, 1996; Tabachnick and Fidell, 2001). Potential outliers were assessed using leverage values (Neter *et al.*, 1996) and DfBetas (Tabachnick and Fidell, 2001). These analyses found no leverage scores higher than 0.35 and no standardized DfBetas greater than an absolute value of 0.80. The evidence from the leverage scores and DfBetas are well within accepted ranges and suggest that there are no outliers.

Before turning to results relevant to the major hypotheses, there are a few nonhypothesized relationships worth noting. First, the results demonstrate a significant positive correlation between entrepreneurial self-efficacy and optimism ($R = 0.44$, $p < 0.01$). As shown in Model 1 of Table 1, however, each of these variables was found to have a different main effect on firm performance. Specifically, entrepreneurial self-efficacy was found to be a positive predictor of firm performance ($\beta = 0.19$, $p < 0.05$),

Table 1. Descriptive statistics and variable correlations

Variables	*Mean*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12
1. Gender	0.16	0.38												
2. Entrepreneurial Experience	0.99	1.33	−0.17*											
3. Firm age	7.81	2.36	0.02	−0.04										
4. Total Employment (Log)	1.27	0.51	−0.12	0.04	−0.04									
5. Total Revenue (Log)	6.20	0.81	−0.13	−0.07	0.01	0.70**								
6. Optimism	5.83	0.93	0.15	0.23**	−0.12	−0.02	−0.05							
7. Entrepreneurial Self-Efficacy (ESE)	5.68	0.68	0.11	0.25**	−0.10	−0.02	0.13	0.44**						
8. Dynamism	16.06	10.43	−0.04	−0.05	0.00	0.12	0.02	0.03	0.09					
9. ESE × Optimism	37.67	91.62	0.06	−0.06	−0.05	0.00	−0.03	−0.26**	−0.24**	−0.11				
10. Optimism × Dynamism	0.15	4.68	0.12	0.00	0.03	−0.03	−0.03	−0.05	−0.15*	0.19*	0.26**			
11. ESE × Dynamism	1.32	13.89	0.04	0.07	0.09	0.05	0.00	−0.14	0.04	0.23**	0.23**	0.34**		
12. ESE × Optimism × Dynamism	21.99	113.47	−0.03	0.12	−0.06	0.08	0.02	−0.02	0.11	0.12	0.45**	0.34**	0.60**	
13. Firm Performance	2.06	11.91	−0.01	0.07	0.05	0.12	0.10	−0.18*	0.12	0.10	−0.18*	−0.30**	0.08	−0.21**

*$p < 0.05$; **$p < 0.01$.

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Table 2. Hierarchical regression model of firm performance

Variables	Firm performance			
	Model 1	Model 2	Model 3	Model 4
	β	β	β	β
Gender	0.02	0.05	0.10	0.09
Entrepreneurial experience	0.07	0.11	0.11	0.14
Firm age	0.04	0.03	0.04	0.02
Total revenue (log)	0.08	0.10	0.10	0.10
Total employment (log)	0.06	0.00	0.00	0.03
Entrepreneurial self-efficacy (ESE)		0.19*	0.10	0.08
Optimism		–0.32**	–0.29**	–0.20
Dynamism		0.10	0.08	0.19*
ESE × optimism			–0.21**	–0.22**
Optimism × dynamism			–0.26**	–0.28**
ESE × dynamism			0.12	0.13
ESE × optimism × dynamism				–0.35**
Δ *F*-Ratio	0.64	5.46**	7.42**	21.65**
Δ R^2	0.02	0.10	0.11	0.10
F-Ratio	0.64	2.48*	4.06**	6.05**
R^2	0.02	0.12	0.23	0.33
Adjusted R^2	0.00	0.07	0.18	0.28

*$p < 0.05$; **$p < 0.01$.

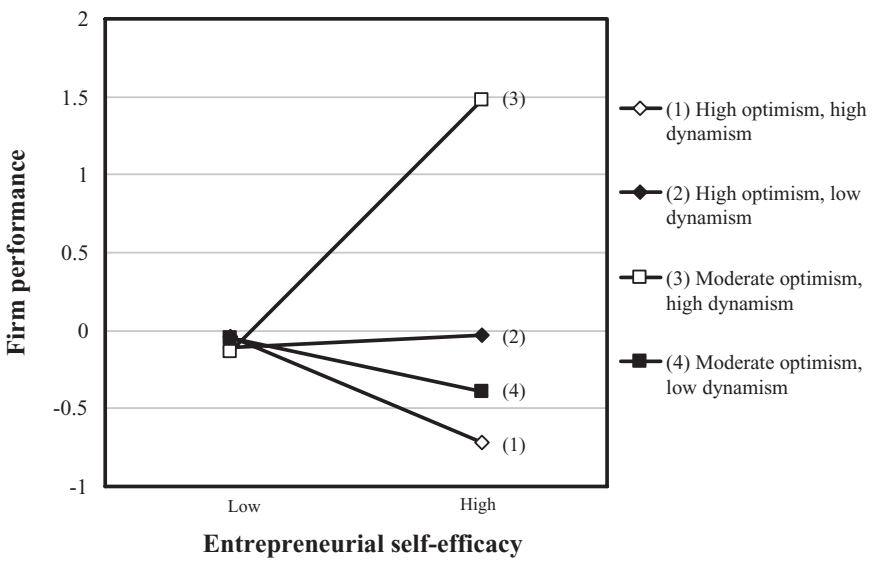

Figure 1. Interactive effects of entrepreneurial self-efficacy, dispositional optimism, and environmental dynamism on firm performance

while optimism was found to be a negative predictor of firm performance ($\beta = -0.32$, $p < 0.01$).

The results of the hierarchical regression analysis (see Table 2) indicate that the interaction between entrepreneurial self-efficacy, optimism, and environmental dynamism is significant for firm performance ($\beta = -0.35$, $p < 0.01$). The three-way interaction accounted for 10 percent unique variance in firm performance above and beyond that which was explained by the control variables, main effects, and

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Table 3. Slope difference tests

Pair of slopes	*t*-value for slope difference	*p*-value for slope difference
(1) and (2)	–2.14	0.03
(1) and (3)	–5.29	0.00
(1) and (4)	–0.49	0.63
(2) and (3)	–3.16	0.00
(2) and (4)	1.62	0.11
(3) and (4)	4.51	0.00

two-way interactions. This suggests general support for our model. We will now discuss the results in relation to the individual hypotheses.

Hypothesis 1 stated that in dynamic industry environments, the effects of entrepreneurial self-efficacy on firm performance will be more positive for entrepreneurs who are moderate—rather than high—in dispositional optimism. As shown in Figure 1, results offered support for this prediction. Slope 3 was found to be significantly more positive than slope 1 ($t = 5.29$, $p < 0.01$). This finding indicates that in dynamic environments, the beneficial effects of entrepreneurial self-efficacy are greater (more positive) for firms led by entrepreneurs who are moderate in dispositional optimism than for those led by entrepreneurs who are high in dispositional optimism. In fact, the effects of entrepreneurial self-efficacy are found to be negative for firms in dynamic environments that are led by highly optimistic entrepreneurs. Therefore, the results provide support for Hypothesis 1.

Hypothesis 2 stated that in stable industry environments, the effects of entrepreneurial self-efficacy on firm performance will be more positive for entrepreneurs who are high—rather than moderate—in dispositional optimism. As shown in Figure 1, results failed to offer support for this prediction. Although the direction of the slopes is in alignment with our prediction, the difference between slope 4 and slope 2 was not significant ($t = 1.62$, $p = 0.11$). This suggests that within stable environments, the effects of entrepreneurial self-efficacy are not moderated by optimism. Therefore, the results fail to offer support for Hypothesis 2.

Overall, the functions illustrated in Figure 1 suggest that the effects of entrepreneurial self-efficacy and optimism are greater in dynamic than in stable environments. This is consistent with literature suggesting that overconfidence is more likely to be problematic for entrepreneurs leading their firms in dynamic, rather than stable, industry environments (Hayward *et al.*, 2006).

DISCUSSION

The results of the present study suggest the following: (1) in *dynamic* environments, entrepreneurial self-efficacy exerts positive effects on performance for firms led by moderately optimistic entrepreneurs, but exerts negative effects on performance for firms led by entrepreneurs who are highly optimistic; (2) in *stable* environments, in contrast, the effects of entrepreneurial self-efficacy on firm performance are less pronounced and not moderated by dispositional optimism—presumably because there is a decreased potential for overconfidence to operate, as compared to dynamic environments. Thus, consistent with the findings of past research (e.g., Baum and Locke, 2004; Baum *et al.*, 2001; Forbes, 2005b) firm performance is, indeed, significantly influenced by entrepreneurs' self-efficacy, but the strength and form of such effects is moderated both by entrepreneurs' level of optimism and industry conditions (stable versus dynamic environments). We now consider these results in terms of recent discussions and findings concerning the potential effects of entrepreneurs' self-efficacy on the performance of their firms.

Self-efficacy: potential benefits, potential costs

Meta-analyses by Judge and Bono (2001) and Stajkovic and Luthans (1998) have demonstrated a robust positive linkage between self-efficacy and work-related performance. Vancouver *et al.* (2001), however, have argued that the strong positive relationship generally found between self-efficacy and performance may derive primarily from the influence of performance on self-efficacy, rather than the

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influence of self-efficacy on performance. In other words, good performance (success, achievement) may generate increased self-efficacy. Interestingly, the results of their study indicated that self-efficacy is negatively related to performance over time. Other studies have also reported a negative relationship between self-efficacy and performance (e.g., Bandura and Jourden, 1991; Stone, 1994; Vancouver *et al.*, 2002), thus suggesting that high levels of self-efficacy do not always generate improved levels of performance. On the contrary, high self-efficacy may sometimes encourage complacency and overconfidence. In response to these findings, Bandura and Locke (2003) have noted that even though self-efficacy may occasionally reduce performers' effort, it also tends to promote the establishment of high (i.e., challenging) goals. This, in turn, can lead to goal discrepancies—gaps between current performance and accepted goals—that increase motivation and positively influence performance. Bandura and Locke (2003) do note, however, that self-efficacy is most likely to generate negative effects on performance when potential outcomes in a given situation are ambiguous or unknown; this would tend to be true in dynamic environments that change rapidly and unpredictably. Consistent with these latter suggestions, the results of the present study indicate that when self-efficacy is coupled with high—rather than moderate—levels of dispositional optimism, negative effects on firm performance occur in dynamic environments. It appears, therefore, that in dynamic environments, the combination of high self-efficacy and high dispositional optimism may generate the complacency or overconfidence reported by Vancouver *et al.* (2001, 2002), perhaps because under dynamic conditions, entrepreneurs tend to overlook or minimize the importance of goal discrepancies. In contrast, and also consistent with this reasoning, such effects are less likely to occur in stable environments. Consequently, as found in the present research, self-efficacy and dispositional optimism were not found to have significant effects on the performance of firms operating in stable environments.

Overall, the present results serve to emphasize a potentially important point, and one that has, perhaps, been somewhat overlooked in the past: high levels of self-efficacy, although often the source of beneficial effects (e.g., enhanced task performance, establishment of challenging goals) do not always yield positive outcomes. On the contrary, in some environments (e.g., highly dynamic ones)—and especially when combined with very high levels of optimism—high self-efficacy may exert detrimental—rather than beneficial—effects on firm performance. Apparently, in dynamic environments, the combination of high self-efficacy and high dispositional optimism is simply *too much of a good thing* where entrepreneurs are concerned. This combination of tendencies leads them to conclude—perhaps erroneously—that they can perform all essential tasks very well (a belief based on high self-efficacy), and that doing so is very likely to result in positive outcomes (a belief derived from high dispositional optimism). As noted previously, such overconfidence may be especially damaging in dynamic environments, which make intense and ever-changing demands on lead entrepreneurs. This is consistent with recent arguments made by Hayward *et al.* (2006) that *entrepreneurial hubris* is most likely to surface among highly confident entrepreneurs leading their firms in dynamic environmental settings.

Theoretical and practical implications

The present findings have both theoretical and practical implications. From a theoretical perspective, they contribute to ongoing efforts to develop theoretical models of entrepreneurship that clarify the mechanisms through which microlevel variables (e.g., motivation, effort, skills, etc.) of individual entrepreneurs influence macrolevel measures of firm performance (e.g., growth in revenue and employment). Understanding these mechanisms is a key task for the field of entrepreneurship, which has increasingly recognized the important role of individual entrepreneurs in firm creation and development (e.g., Baron, 2007, 2008). For instance, as noted by Shane, Locke, and Collins (2003: 259) 'Entrepreneurship involves human agency. The entrepreneurial process occurs because people act to pursue opportunities . . .' To the extent that this is the case, understanding how entrepreneurs' skills, abilities, characteristics, motives, and attitudes influence firm performance is a crucial task. The present findings contribute to this ongoing effort by indicating that two microlevel variables—self-efficacy and dispositional optimism—significantly influence firm performance. Further, as suggested by the findings of previous research (e.g., Baum and Locke, 2004), such effects are *not* direct or straightforward in nature. Rather, they are complex and are moderated by crucial environmental variables, such as dynamism. Understanding the interface between micro- and macrolevel variables

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is a complex task (Hitt *et al.*, 2007), but acquiring full understanding of such effects is crucial to the development of a comprehensive theory of entrepreneurship (Shane, 2003).

From a practical perspective, the present findings suggest that there can, in fact, be *too much of a good thing* where entrepreneurial self-efficacy and dispositional optimism are concerned. In particular, in the dynamic environments in which entrepreneurs often lead their firms, high self-efficacy coupled with high dispositional optimism can actually generate negative effects on firm performance. Since many entrepreneurs are relatively high on both of these dimensions, the key question of how they can counter these tendencies and the negative effects they tend to produce in dynamic environments arises. A large body of evidence in the field of cognitive science suggests one possible answer. Through appropriate training—carefully focused *directed practice*—individuals can acquire enhanced *self-regulatory mechanisms* that can help them hold these personal characteristics in check (e.g., Cleary, Zimmerman, and Keating, 2006; Ericsson and Charness, 1994; Kanfer, 1990; Schraw and Dennison, 1994). Self-regulatory mechanisms are aspects of cognition that assist individuals in monitoring, regulating, and enhancing their own performance. Such mechanisms typically involve self-generated thoughts, feelings, and actions that are strategically planned and adapted to the attainment of personal goals (Zimmerman, 2006). In other words, self-regulatory skills and mechanisms provide *executive functions* that permit individuals to allocate effort and regulate various covert and overt activities to attain specific goals (Cleary *et al.*, 2006; Kanfer, 1990; Schraw and Dennison, 1994). In the present context, enhanced self-regulatory mechanisms would enable entrepreneurs to recognize their own tendencies toward optimism and their personal beliefs that they can perform well at almost any task they attempt, and—most significantly—to balance these tendencies with realistic assessments of what they can and cannot accomplish and the outcomes they can realistically expect to attain. Entrepreneurs who acquire well-developed self-regulatory mechanisms may be more likely to convert their own dual strengths of high self-efficacy and optimism into high firm performance. In contrast, those who do not may fall prey to the potential dangers of these characteristics (e.g., overconfidence, complacency), and adopt strategies and actions that actually interfere with firm success. Only further research on this issue can indicate whether enhanced self-regulatory skills can help entrepreneurs translate their self-efficacy and optimism into high levels of firm performance. However, given the valuable benefits obtained from such skills in a wide range of contexts (e.g., Cleary *et al.*, 2006), it seems possible that they might also be of major assistance for entrepreneurs in planning, launching, and operating successful businesses.

LIMITATIONS AND FUTURE DIRECTIONS FOR RESEARCH

There are some noteworthy limitations to the current study, which suggest opportunities for future research. First, although our findings uncovered contextual differences in the relationship between entrepreneurial self-efficacy and firm performance, we did not examine the underlying mechanisms through which such effects occurred. Therefore, future research might consider, for example, the use of heuristic versus systematic decision-making processes by entrepreneurs as pathways mediating the effects identified in the current study.

Second, the specific nature of our sample (i.e., individuals who were founders and CEOs of their firms) may limit the extent to which our findings can be generalized to the context of other types of organizations. As we have already noted, entrepreneurs tend to fall on the high end of the optimism-pessimism dimension, thus restricting the range of optimism that we were able to examine. In future research, it may be of interest to consider the interaction between optimism and self-efficacy of individuals who are more representative of the full range of optimism versus pessimism as it occurs in the general population.

Third, our sample size and response rate may limit the extent to which our results can be generalized. With a larger sample, we would have been able to better evaluate potential differences in our results based on ethnicity, gender, and other minority characteristics. Although the response rate for our study is not high, it is in alignment with other studies of top management (e.g., DeTienne and Koberg, 2002; Neck *et al.*, 2004). By using a national random sample of entrepreneurs, we increased our ability to acquire data that were representative of the overall population of entrepreneurs, but reduced our potential for a high response rate, which we may have achieved using a convenience sample.

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Finally, we assessed only the entrepreneurial self-efficacy and dispositional optimism of CEOs, rather than that of entire top management teams. It might be instructive, in future studies, to consider whether similar relationships might be found at the team level. For example, are there team and/or contextual variables that moderate the effects of collective efficacy within founding top management teams? Further, how does the self-efficacy and optimism of lead entrepreneurs affect the composition and development of their top management teams? For example, a multi-level examination might consider the extent to which the self-efficacy of lead entrepreneurs relates to the collective efficacy of the new venture top management team. Here it would be interesting to determine whether entrepreneurial hubris on the part of lead entrepreneurs is linked with team hubris or even organizational hubris. Although there have been countless studies of group efficacy within the context of large, established organizations (e.g., Lester, Meglino, and Korsgaard, 2002), with few exceptions (e.g., Ensley and Hmieleski, 2005), there has been a dearth of research on this topic within the entrepreneurship literature.

CONCLUSIONS

Is high entrepreneurial self-efficacy always beneficial to entrepreneurs? Previous literature suggests that it is (Baum *et al.*, 2001; Baum and Locke, 2004). However, our results indicate that although high entrepreneurial self-efficacy is generally beneficial for entrepreneurs, there are situations in which it may prove detrimental. Without some expectation that negative outcomes might occur to keep such beliefs in personal efficacy in check, entrepreneurs attempting to lead their start-ups toward growth under rapid and unpredictably changing environmental conditions—especially entrepreneurs who are also high in dispositional optimism—may gradually move toward complacency, overconfidence, a tendency to assume excessive risk, and other ineffective strategies. Of particular concern are two facts. First, the combination of high self-efficacy and high dispositional optimism is far from rare among entrepreneurs. In fact, it appears to be a very common pattern. Second, entrepreneurs who possess the combination of high entrepreneurial self-efficacy and high dispositional optimism are, perhaps, the ones most likely to be drawn toward starting firms in dynamic industry environments. As shown by the current findings, this combination can have strong negative effects on firm performance. We suspect that this misalignment between the individual characteristics of entrepreneurs and the environments in which they lead their firms might be one factor contributing to the high incidence of failure for start-ups. We hope, therefore, that our findings will encourage entrepreneurs to develop an awareness of their own dispositions and tendencies. Such enhanced personal awareness may help them regulate their behavior in accord with the requirements of the environments they face. And such correspondence between personal and environmental factors, in turn, may enhance the likelihood that they will attain the success they so passionately seek—successful conversion of their plans and visions into profitable, operating companies.

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