AN EXAMINATION OF THE ROLE OF OPPORTUNITY COST AND OPPORTUNITY VALUE IN NEW VENTURE CREATION

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ABSTRACT

Why do entrepreneurs pursue opportunities when others do not? Differences between entrepreneurs and the general population have been found in relation to various cognitive biases, and these biases have been found to affect risk perception, and the decision to pursue opportunities. A pilot study showed entrepreneurs focused more on potential value, while non-entrepreneurs focused on cost. This paper seeks to extend existing theory by proposing a mediated model whereby opportunity cost and opportunity value mediate the relationship between cognitive biases and risk perception on the one hand, and the decision to pursue an opportunity on the other hand.

INTRODUCTION

Why do entrepreneurs pursue opportunities when others do not? Research has looked at the personalities of entrepreneurs and found no clear-cut differences between entrepreneurs and the general population (Shaver & Scott, 1991). However, differences between these groups have been found in relation to several cognitive factors, namely overconfidence (Busenitz & Barney, 1997) the illusion of control, and belief in the law of small numbers (Simon, Houghton, & Aquino, 2000).

These cognitive biases may affect how the entrepreneur values opportunities and perceives risk (Palich & Bagby, 1995). This does not imply that entrepreneurs do not evaluate opportunities based on opportunity cost and the perception of the risk involved; rather, it means that entrepreneurs evaluate opportunities and risk using different perspectives than the typical manager. Accordingly, entrepreneurs will base their go/no go decision to pursue an opportunity on their interpretation of the opportunity value and their perception of the risk. While opportunity cost is well recognized in the literature, opportunity value, or the perceived tangible and intangible benefits to be derived from the pursuit of a new opportunity, has not (to our knowledge) been addressed in the literature, and the combination of opportunity value and opportunity cost have not been considered specifically in terms of new venture pursuit.

Prior research has shown that cognitive biases affect risk perception as well as the decision to pursue an opportunity (Simon et al., 2000). This paper seeks to extend existing theory by proposing a mediated model whereby opportunity cost and opportunity value mediate the relationship between cognitive biases and risk perception on the one hand, and the decision to pursue an entrepreneurial opportunity on the other hand. We propose that cognitive biases and risk perception affect the evaluation of opportunity cost and opportunity value, which then ultimately lead to the decision to pursue an opportunity. This paper details the cognitive biases generally attributed to entrepreneurs; defines opportunity cost, opportunity value, and risk perception; and then shows how these areas are related with respect to the decision by an entrepreneur to pursue an opportunity. In so doing, this research will add to entrepreneurship theory in relation to the entrepreneurs’ decision to pursue an opportunity.

This paper proceeds as follows. First, the literature concerning entrepreneurs, opportunity value, cognitive biases, and risk is reviewed. Second, a model with hypotheses is presented, followed by the results, limitations and discussion section. The paper concludes with some thoughts for future research.
This section reviews the literature concerning entrepreneurs and new venture pursuit, opportunity value, cognitive biases, and risk. We explain what cognitive biases are, shows how they differentiate entrepreneurs and managers, list some of their effects, and detail the biases included in this research.

Entrepreneurs and New Venture Pursuit

Entrepreneurship is “concerned with the discovery and exploitation of profitable opportunities”: it occurs at “the nexus of two phenomena: the presence of lucrative opportunities and the presence of enterprising individuals” (Shane & Venkataraman, 2000: 217-218). J.S. Mill was the first to utilize the term entrepreneur, and his definition included risk bearing (to differentiate entrepreneurs from managers) as well as the elements of directing and controlling (J.S. Mill 1854). Schumpeter emphasized the role that entrepreneurs play, not only as risk takers but also as innovators with the ability to combine resources in the creation of innovation that disrupts economic systems and transforms industries (Schumpeter, 1934).

One of the research questions pursued in the entrepreneurship literature is why some people, but not others, recognize and act upon opportunities. Many studies seek to differentiate entrepreneurs from other people (including managers) based on personal and demographic characteristics (Begley & Boyd, 1987; Brockhaus, 1980; Cooper & Dunkelberg, 1987; Sexton & Bowman, 1984). Unfortunately, this stream of research has produced no conclusive characteristics that distinguish entrepreneurs from others (Low & MacMillan, 1988; Shaver & Scott, 1991).

Kirzner’s (1973; 1979) theory of entrepreneurial “alertness” suggests an environment of continuous disequilibrium in which entrepreneurs fill in the discontinuities through recognition and exploitation of opportunities. Under this theory, entrepreneurs hold a unique preparedness to recognize opportunities and act on them. Entrepreneurial alertness suggests that entrepreneurs are capable of foreseeing disequilibrium profit opportunities when encountered; and that entrepreneurs are ready to exploit. An empirical study of entrepreneurial alertness showed significant differences between entrepreneurs and managers in their sources of information, ways of obtaining information, and among the ways that entrepreneurs and managers evaluate information (Kaish & Gilad, 1991). Another study found evidence of differences related to opportunity alertness between individuals with engineering training and those with business training (Craig & Johnson, 2006). This research implies that education regarding business opportunities increased both the awareness of the existence of entrepreneurial opportunities and students’ self-efficacy in their ability to recognize opportunity.

Regardless of the source of the differences between entrepreneurs and managers, whether entrepreneurs intend to take risks or not, whether they attempt to disrupt economic systems or not, entrepreneurs can be identified by their actions. This paper defines an entrepreneur in a fashion analogous to that of Shane and Venkataraman (2000). When an enterprising individual views a situation, whether it be product, market or process, makes a conjecture that a set of resources is not put to its’ optimum use, and then acts upon that opportunity, this individual has become an entrepreneur. This definition focuses on the words “acts upon that opportunity” and allows entrepreneurs to develop over time, or appear to be born in an instant. It does not require a successful venture, as success or failure does not make one an entrepreneur. It also does not require a new business as opportunity can exist within existing organizations, or can be sold or licensed to other enterprises.

If entrepreneurship is concerned with the discovery and exploitation of profitable opportunities, and discovery occurs when someone looks at a situation and makes a conjecture that a set of resources is not put to its best use, by definition, not all parties value each combination of resources identically. Asymmetries of information are typically credited with creating dissimilar opinions regarding the value of resources in particular combinations. Specifically, the possession of prior information is required in order to identify the opportunity, and requisite cognitive properties are necessary to value the opportunity
(Shane & Venkataraman, 2000). Deciding whether an opportunity is worth pursuing then depends upon the actual value attached to the opportunity by the individual.

Recently, researchers have looked into the cognitive differences between entrepreneurs and non-entrepreneurs. The unifying assumption of this stream is that some people become entrepreneurs, not because they have distinct traits but, because they perceive situations differently than others (Baron, 2000; Busenitz & Barney, 1997; Gatewood, Shaver, & Gartner, 1995; Palich & Bagby, 1995; Shaver & Scott, 1991; Simon et al., 2000). These cognitive differences affect one’s perception of an opportunity’s potential risk and reward as well as the security of one’s personal situation.

Given the scarcity of literature detailing how entrepreneurs determine the value of an opportunity, which variables impact the decision to pursue an opportunity, and entrepreneurs’ perception of value and cost, the following sections delineates a proposed model encompassing cognitive biases, risk perception, opportunity value and opportunity cost.

**Opportunity Value**

A pilot study was conducted to examine the role that opportunity value and opportunity cost play in the pursuit of a new business opportunity. In this study, the first author conducted a series of semi-structured interviews with self described entrepreneurs and non-entrepreneurs (professionals and managers). Each individual was asked what factors need to be considered, and what questions have to be asked, in order for them to consider a new business opportunity. Interviewees were also asked to identify any costs and benefits of pursuing an opportunity.

In general, the entrepreneurs focused more on the goals of the future organization. What is the market? What problems are being solved? Who are the people involved? What is the vision? In contrast, professionals asked about interesting work, geographical location, and a few raised doubts as to their capability to handle the situation. Both groups considered money, but from different perspectives. While entrepreneurs assumed that money would be made, the professionals specifically asked about salary and benefits. In terms of requisite knowledge, entrepreneurs often acknowledged they would need to put in effort to get up to speed, while professionals were typically concerned about a lack of business knowledge, and managers were concerned about other deficiencies. Both groups talked of passion, but while the professionals were passionate about the work itself, the entrepreneurs were passionate about the business idea.

The conclusion is that entrepreneurs and non-entrepreneurs consider different factors in determining the pros and cons of a business opportunity. This goes to the mindset, or cognition of the individual. Entrepreneurs considered more intangible, futuristic, and self-motivational items than did non-entrepreneurs. In addition, entrepreneurs focused more on the potential values that could be obtained, while non-entrepreneurs focused more on the costs. For this article, opportunity value is defined as the perceived tangible and intangible benefits to be derived from the pursuit of a new opportunity.

**Cognitive Biases**

Economic theory regarding decision making typically refers to fully rational, profit-maximizing decisions, where multiple people can draw similar conclusions from like data. This rational model of information processing assumes people have unlimited mental capacity, and thoroughly process all relevant information in order to maximize outcomes. However, Simon (1955) emphasized that decision makers have limited computational capabilities that interact with the complexity of task environments to produce bounded rationality. This means that individuals do not always perform comprehensive searches, nor accurately interpret information, due to cognitive limitations. This limited capacity model explains the role of cognitive biases, (thought processes) heuristics, (rules of thumb) and an assortment of simplifying strategies used to reduce information-processing demands. In addition, limited capacity models recognize that the use of cognitive shortcuts and simplifications are employed without conscious thought, and typically lead to somewhat predictable response biases. While these biases do not always
cause judgment errors, they often give rise to adequate but maybe less than optimal behaviors (Cooper, Folta, & Woo, 1995; Lord & Maher, 1990; Schwenk, 1986). As an example, research on gambling shows that individuals employ a number of heuristics to simplify decision making as a function of response mode, time pressure, and task complexity (Payne, 1982).

“Cognitive heuristics… are part of the psychological account of ways in which the external environment becomes represented in the mind of a person… they represent the internal process presumed to mediate between the stimuli (such as opportunities) presented by the external environment and the responses (such as organization founding) that are critical dependent variables in the study of new venture creation” (Shaver & Scott, 1991: 36).

Cognitive biases and heuristics can be an effective and efficient guide to decision-making under conditions of uncertainty and complexity. In situations where comprehensive and careful decision-making is not possible, biases and heuristics may provide a quick and effective method of approximating the proper decision (Busenitz & Barney, 1997; Tversky & Kahneman, 1974).

Research into human cognition has produced some conclusions of interest: 1) judgmental heuristics are not independent of context or content (Kahneman & Tversky, 1996); 2) our capacity to process new information about the world around us is severely limited (Simon, 1955); 3) “we seek to minimize cognitive effort… and often use ‘short-cuts’ in our thinking, techniques that reduce mental effort” and 4) “because of our limited information processing capacity… and other factors… we are less than totally rational in our thinking” (Baron, 1998: 278). The conclusion is that human cognition is subject to an assortment of biases and errors; it is most likely to be influenced by these biases when: 1) we suffer from information overload, 2) faced with new situations, 3) emotions run high and, 4) faced with time pressure (Baron, 1998).

Differences between Entrepreneurs and Managers

Busenitz and Barney (1997), comparing entrepreneurs and managers in large organizations, showed correlations between the cognitive biases of overconfidence and representativeness (similar to the law of small numbers) and the individual’s vocation (entrepreneur versus manager) and demonstrated that, even though individuals utilize biases and heuristics to varying degrees, in general, entrepreneurs and managers think differently. In fact, the variables that represented overconfidence and representativeness identified entrepreneurs versus managers in excess of 70% of the time. “Those who are more susceptible to the use of biases and heuristics in decision-making are the very ones who are most likely to become entrepreneurs” (Busenitz & Barney, 1997: 14).

It may just be that those who are comfortable with the use of heuristic shortcuts in decision-making are attracted to entrepreneurial type settings, where quick decisions are both desirable and necessary. In contrast, those who prefer comprehensive and deliberate decision-making are drawn to the standard corporate environment where ample resources are available to aid in decision-making. This appears quite reasonable; after all, using biases and heuristics to simplify the decision process with regard to opportunity evaluation may be critical to meeting limited windows of opportunity. In many cases, there may not be adequate time to collect and evaluate sufficient data to analyze the decision in a more deliberate style (Busenitz & Barney, 1997; Simon et al., 2000; Tversky & Kahneman, 1974).

Effects of Cognitive Biases on Entrepreneurs

In a study of 2,994 entrepreneurs who had recently become business owners, 81% saw their odds of success as 7 out of 10 or better; and 33% saw their odds of success of 10 out of 10 (Cooper, Woo, & Dunkelberg, 1988). With most studies showing the probability of success for a new organization at less than 35%, it appears that these new entrepreneurs may be overconfident in their ability to surmount the odds normally associated with new business ventures. The bounded rationality model would suggest that these entrepreneurs might have been blinded to the need to acquire additional information due to their overconfidence (Cooper et al., 1995). It was also observed that while entrepreneurs assigned relatively
high odds to their firm’s success, they assigned somewhat lower odds to the success of other similar firms (Cooper et al., 1988). This would lead one to believe that the entrepreneurs rated their own chances higher than that of other firms due to their own involvement in the venture.

Evidence suggests that in a dynamic environment, where decision processes need to be able to rapidly adapt to external changes, the use of heuristics, mental models, and quantitative models for learning may be of more importance than the ability to design perfect processes (Krabuanrat & Phelps, 1998). This correlates with research showing that biases and heuristics may be critical for explaining variations in strategic management decisions (Haley & Stumpf, 1989) as they have been associated with innovation, and may be especially prevalent among entrepreneurs (Busenitz & Barney, 1997). Heuristic based logic seems to enable one to make rapid sense of uncertain and complex situations (Alvarez & Busenitz, 2001). These findings are important for all organizations as innovation is the key to differentiation. As was stated in reference to entrepreneurs, “Their heuristic-based logic appears to give them a competitive advantage in quickly learning about new changes and what the implication of those changes are for the development of specific discoveries” (Alvarez & Busenitz, 2001: 760).

**Cognitive Biases included in this Research**

Although research has identified many cognitive biases, this article focuses on the three that have been found most relevant in prior entrepreneurship literature: the **illusion of control**, which occurs when individuals overemphasize the extent to which their skill can increase performance in situations where chance plays a large part and skill is not necessarily the deciding factor (Langer, 1975); **belief in the law of small numbers**, which occurs when an individual uses a limited number of informational inputs or references to draw conclusions (Simon et al., 2000; Tversky & Kahneman, 1974); and **overconfidence**, which refers to the situation where individuals’ convictions that their predictions are correct exceed the accuracy of those predictions (Simon & Houghton, 2003). According to Simon et al. (2000), these aforementioned biases have been shown through prior research (Busenitz & Barney, 1997; Cooper et al., 1988; McCarthy, Schoorman, & Cooper, 1993; Schwenk, 1986; Staw, 1991) to, occur when one faces a novel situation, reduce the perception of risk and, arise when one is making a decision. These biases are the key to how one reacts to, and values, a perceived opportunity.

**Illusion of Control.** The illusion of control, which tends to appear strongest in individuals who have experienced prior success, permits decision makers to overestimate the extent to which outcomes are under their personal control, and consequently allows decision makers to assume that even should problems arise, they can correct the situation and make the business successful (Duhaime & Schwenk, 1985). In studies conducted by Langer (1975), subjects tended to overestimate the impact of their skills on outcomes and expressed an expectancy of personal success much higher than objective probability would warrant. It would then appear reasonable that if a person focuses on what they can control when formulating plans, that person will inherently spend less time focusing on what they can not control (Duhaime & Schwenk, 1985). Therefore, when estimating chances of success, the person with high levels of the illusion of control may tend to overlook factors that are beyond their control and that might lead to failure. In addition, overestimating the extent of one’s personal control may reduce anxiety when confronting an uncertain environment. This overestimation may stem from the notion that people seek out information that supports their opinion while ignoring information that is contradictory (De Carolis & Saparito, 2006). Finally, those exhibiting the illusion of control may underestimate risk because they believe their skills to be greater than those of others, and that they can overcome whatever obstacles arise (Simon et al., 2000).

**Belief in the Law of Small Numbers.** By relying upon a small number of inputs to draw conclusions (Tversky & Kahneman, 1974), one can be unduly influenced by limited feedback as small samples may not be representative (Simon et al., 2000). This is related to research showing that subjects ignore base-rate probabilities when making decisions (Cooper et al., 1988). In contrast, the law of large numbers suggests that conclusions about populations can be inferred from analysis of large random samples. Of course, restricted periods of opportunity, inadequate resources, or lack of available information may make
obtaining a large sample nearly impossible. The questions then becomes, how comfortable is the person at making a decision with limited information? Research has shown that entrepreneurs are sometimes willing to make decisions based on personal experience and small non-random samples (Busenitz & Barney, 1997).

**Overconfidence.** Overconfidence is defined as overestimating the probability of being correct (Simon & Houghton, 2003); it is a failure to know the limits of one’s knowledge (Russo & Schoemaker, 1992). In the cognitive domain, the beliefs that result in overconfidence are also liable to result in premature cessation of problem-solving efforts and insufficient checking of memory retrieval (Metcalf, 1998). Overconfidence may occur because individuals do not adequately revise preliminary estimates upon receiving new or updated information, known as the anchoring heuristic or because of the ease with which they call to mind reasons for assurance, known as the availability heuristic (Tversky & Kahneman, 1974). Then, “because we fail to envision important pathways in the complex net of future events, we become unduly confident about predictions based on the fewer pathways we actually do consider” (Russo & Schoemaker, 1992: 11). Because those who are overconfident may treat their assumptions as facts, they may perceive their actions to be less risky than they actually are (Simon et al., 2000). Entrepreneurs typically project future events, and research has shown that greater temporal distance enhanced expectancy of success and risk-taking, particularly by individuals who were success rather than failure oriented (Nisan, 1972).

**Risk**
Risk (as a characteristic of decisions) is defined as “the extent to which there is uncertainty about whether potentially significant and/or disappointing outcomes of decisions will be realized,” risk perception as “a decision maker’s assessment of the risk inherent in a situation” and risk propensity as “an individual’s risk taking tendencies.” Therefore, if an individual believes that the odds of success are small, and proceeds anyway, a risky venture is undertaken and the individual’s risk propensity may be deemed high. Likewise, if the individual believes that the venture has a high probability of success, a not so risky venture is undertaken, and the individual’s risk propensity cannot be deemed as high. (Sitkin & Pablo, 1992: 10 - 12)

It had previously been thought that the typical entrepreneur possessed higher levels of risk tolerance than non-entrepreneurs did, or that entrepreneurs pursued opportunities because of their propensity to take risks. Research has shown this to not be true (Brockhaus, 1980; Palich & Bagby, 1995); and in fact, the distribution of risk taking propensity for entrepreneurs matches that of the general population (Brockhaus, 1980). Entrepreneurs may in fact undertake ventures that, while others may see as risky, they see as not risky. For instance, a study of high-technology entrepreneurs found that fully two-thirds of the respondents did not perceive the venture as high risk (Corman, Perles, & Vancini, 1988). But, as Park explained,

“Just because entrepreneurs do not perceive themselves to be more willing to take calculated risk, does not mean that they are risk averse. This only implies that they simply do not perceive themselves to be taking risks” (Park, 2005).

**MODEL AND HYPOTHESES**

Figure 1 proposes that the cognitive biases of overconfidence, the illusion of control, and belief in the law of small numbers, along with risk perception will influence one’s decision to pursue an entrepreneurial opportunity, but mediated by opportunity cost and opportunity value.

**Cognitive Biases and Risk Perception**
Schoemaker, for simplicity, described levels of rationality (according to various literature) as being from “supreme rationality” at the top, to simple “automatons, with limited working memories and myopic frames (Simon, 1955)” at the bottom (Schoemaker, 1993: 65) with the intimation that individuals fall
somewhere in-between. Under this limited capacity model of decision-making, individuals do not always perform comprehensive searches, nor accurately interpret information due to cognitive limitations. To accommodate for these limitations, people make use of cognitive heuristics and an assortment of simplifying strategies that may lead to response biases (Cooper et al., 1995; Schwenk, 1986). The argument, that individuals with cognitive biases may be susceptible to lower perceptions of risk has been put forth by several authors (Busenitz & Barney, 1997; Shaver & Scott, 1991) and demonstrated by others (Palich & Bagby, 1995; Simon et al., 2000). If the definition of risk perception is a decision maker’s assessment of the risk inherent in a situation (Sitkin & Pablo, 1992) and cognitive biases reduce one’s perception of risk, then it is clear why research shows that given the same situation, each individual perceives a different level of risk (Nutt, 1993).

Previous research has shown that the illusion of control lowers risk perceptions (Keh, Foo, & Lim, 2002; Simon et al., 2000) while mixed results have been found with the law of small numbers. In the Simon et al. (2000) study, the law of small numbers lowered risk perception while results in the Ken, et al. (2002) study were not significant. In neither study was overconfidence related to risk perception. The following propositions attempt to confirm prior theory by testing the relationship between risk perception and two cognitive biases: the illusion of control, and belief in the law of small numbers.

Hypothesis 1a. The illusion of control is negatively correlated with risk perception
Hypothesis 1b. Belief in the law of small numbers is negatively correlated with risk perception

Cognitive Biases and Opportunity Value

A survey of MBA students (Simon et al., 2000) captured the respondents’ cognitive biases, risk perceptions, and a decision to start a hypothetical business (based on a teaching case). The results showed, as expected, a significant negative relationship between risk perception and the new venture decision (after controlling for optimism, flexibility and risk propensity). In addition, the study found that the illusion of control and belief in the law of small numbers positively affected the new venture decision, both directly, and through lowered risk perceptions, explaining over 33% of the variation. Intuitively, cognitive biases that lead to lower perceptions of risk, should lead to a higher percentage of positive new venture decisions.

In a study by Palich and Bagby (1995), survey results from a group of individuals believed to represent entrepreneurs, were compared to those from a group of individuals believed to represent the general population of the business community. In this study of framing, it was believed that entrepreneurs and non-entrepreneurs would demonstrate similar propensities for risk, but would view situations differently. Subjects were given equivocal business scenarios to read and were asked to rate the strengths, weaknesses, opportunities, and threats associated with the given situation as well as rate the future possibilities of the theoretical organization. The results showed a similar risk propensity for both groups as was expected. In addition, entrepreneurs rated the strengths higher than the weaknesses, and the opportunities higher than the threats, more often than did the non-entrepreneurs. In the measure for potential, the entrepreneurs were again more optimistic about the future for the theoretical firm.

“These results indicate that in contrast to other business people, entrepreneurs tend to perceive the firm’s environment as holding more opportunities or external potentials to be exploited and fewer threats against which to guard. This too, is consistent with cognitive theory. That is, responding to the same business situation, entrepreneurs will associate the firm with a schema suggesting positive environmental attributes” (Palich & Bagby, 1995: 433).

In a study by Ken, Foo and Lim (2002), both overconfidence, and belief in the law of small numbers, were found to directly affect evaluation of the opportunity while the illusion of control’s impact was found to be mediated by risk perception. This differs from the study by Simon et al (2000) where risk perception was found to only partially mediate the relationship between the law of small numbers and the illusion of control concerning the decision to start a venture. According to Ken, Foo and Lim, this
discrepancy may reflect the difference in samples. Simon et al. had used MBA students, who may have been less realistic about their ability to control the market, while the Ken, Foo and Lim study consisted of small business owners who may have realized their limited ability to influence the overall market (Keh et al., 2002).

The studies mentioned above suggest that lower levels of risk perception and higher levels of cognitive biases positively affect the decision to pursue an opportunity. Nevertheless, for an entrepreneur to pursue an opportunity, she must find the opportunity personally desirable and feasible (i.e., within their control and competence). The state of being desirable and feasible is of course subjective to the individual (Krueger, 1993) and implies that opportunity value contains both tangible and intangible components.

It is the authors’ conjecture that, in general, entrepreneurs and non-entrepreneurs will focus on different items when considering a new opportunity. Entrepreneurs will place more emphasis on the benefits, while non-entrepreneurs will place more emphasis on the costs. The following proposition will test the relationship between the three cognitive biases and opportunity value, as well as between perceived risk and opportunity value.

**Hypothesis 2a.** Overconfidence is positively correlated with opportunity value

**Hypothesis 2b.** The illusion of control is positively correlated with opportunity value

**Hypothesis 2c.** Belief in the law of small numbers is positively correlated with opportunity value

**Hypothesis 2d.** Risk perceptions is negatively correlated with opportunity value

**Cognitive Biases and Opportunity Cost**

Scarcity of resources is one of the more basic concepts of economics; it means not having sufficient resources to produce enough to fulfill unlimited subjective wants. This results in having to trade off one good against others, which results in an opportunity cost. Opportunity cost is typically defined in economics as the profit lost by diverting input factors from one use to another. It is a measure of the profits forgone by choosing one opportunity over another (Rayburn & Sullivan, 1972; Shaw, 1992).

For this paper, the definition of opportunity cost is expanded to include both tangible and intangible components. In the context of the decision to pursue an opportunity, the entrepreneur is weighing the tangible and intangible value of the current situation as well as the time and resources necessary to pursue the opportunity, versus the potential gains of the new venture. In short, for one to pursue an opportunity, the expected value of the entrepreneurial profit must be large enough to compensate for the opportunity cost of other alternatives (Amit, Muller, & Cockburn, 1995; Shane & Venkataraman, 2000).

The value, both monetary and otherwise, that is attached to one’s current position is at least partially based on a person’s perceptions of how easily the benefits of that position can be replaced. For example, a study of high-tech entrepreneurs found its subjects to be highly educated, stable and successful individuals who were not concerned about possible future employment due to high demand for their skills; and more than one-third noted their ability to predict market or technological conditions ten years in advance (Corman et al., 1988). It may be that this group of entrepreneurs’ skill level affords them a comfort level that lowers their perception of risk concerning the new venture; but the groups’ confidence in their skills and ability to predict market conditions appears to show signs of two cognitive biases, the illusion of control and overconfidence. We propose that these cognitive biases affected the participants’ view of their opportunity cost; believing that they could find another job quite easily if the new venture does not pan out. This perception devalues the current position and consequently lowers the perception of opportunity cost. And research has shown that individuals are more likely to undertake entrepreneurial activity as opportunity cost declined (Amit et al., 1995). This leads to the propositions concerning the affect of cognitive biases on opportunity cost.

**Hypothesis 3a.** Overconfidence is negatively correlated with opportunity costs

**Hypothesis 3b.** The illusion of control is negatively correlated with opportunity costs
Cost, Value, and the Decision to Pursue an Opportunity

This paper assumes that both the manager and the entrepreneur place a value on a given situation. They will each, whether subjectively or objectively, weigh the cost and benefit of staying in their current position versus taking the risk, and potential reward, of pursuing an opportunity. Due to the effect of cognitive biases, the entrepreneur will value the situation differently than will the manager (Palich & Bagby, 1995; Simon et al., 2000). Both managers and entrepreneurs can potentially build a payoff chart showing percentages of high, medium and low payoff, along with payoff amounts for each category. Nevertheless, if the entrepreneur places dissimilar percentages and payoff amounts on the chart, these different percentages and payoff amounts will lead to a different conclusion.

If the typical entrepreneur believes, based on his view of the risk-reward equation, that the environment is good and the possible payoff is high, this is similar to viewing a payoff table using a maximax decision rule versus a minimax decision rule for the standard manager. Maximax is an optimistic approach, which assumes excellent market conditions and typically leads to a high payoff choice while the minimax is a conservative approach that assumes poor market conditions and therefore chooses a lower payoff (Rayburn & Sullivan, 1972). Clearly, if two individuals can look at the same scenario, and come to different conclusions regarding the level of risk, and the payoff potential, it makes perfect sense that those who value the opportunity potential higher are more likely to pursue the opportunity; and those who value the opportunity cost higher are less likely to pursue the opportunity.

The proposed model claims that the effect of cognitive biases and risk perception on the decision to pursue an opportunity is mediated by perceived opportunity cost and perceived opportunity value. A higher net (value less cost) should lead to a higher probability of pursuing the opportunity. This leads to the final set of propositions, testing the effect of opportunity cost and opportunity value on the ultimate decision to pursue a new opportunity.

Hypothesis 4a. Opportunity cost is negatively correlated with the decision to pursue a new opportunity

Hypothesis 4b. Opportunity value is positively correlated with the decision to pursue a new opportunity

METHODS

This research examines the effect of cognitive biases on risk perception, the decision to pursue an opportunity, and the intermediate constructs of opportunity value and opportunity cost. To obtain a sample with varying levels of cognitive biases, cross sectional survey data was collected at a major university in the northeastern section of the United States. E-mails were sent to a sub-section of the population of the business school (graduate and undergraduate) and business incubator requesting voluntary and anonymous participation in a study of cognitive processes and decision-making; no incentives were offered for participation. The e-mail contained a link to a web-based survey for collection of data and preservation of anonymity. This procedure of collecting data on-line saves time and reduces the possibility of transcription errors as respondent data is entered directly to a secured database for later analysis. While data was still being collected at the time this article was submitted, sufficient responses were collected to allow for the presentation of preliminary results. The statistics detailed in the remainder of this paper are based on this preliminary data collection of 99 valid responses. The demographics are as follow, 50.5% are male and 32.3% are married or living with a partner. 42.4% work full time, 29.3% work part-time with the remaining 28.3% not working. 49.5% of the respondents are under age 25, 19.2% are age 25-40, 14.1% are age 41-55 with the remaining 17.2% being over age 55. 71.7% report being Caucasian, 19.2% Asian, 19.2% African-American, 1% Hispanic and 3% other. For education, 13.1% report little or no college (most likely freshman) 49.5% report some college or an associate’s degree, 17.2% claim a bachelor’s degree and 20.2% report having a graduate or professional degree. 72.7% claim no children under age 18, 18.2% report 1 child, and the remaining 9.1% report 2-4
children. 21 claimed to have started a business previously, and 18 additional respondents plan to start a business in the next 5 years, therefore 39 of 99 either have started, or plan to start, a business.

A business case scenario was developed for use in this research. It detailed the working situation of a hypothetical person named Pat Smith, along with a potential new business opportunity. Respondents were asked to read the scenario and then indicate the extent to which they agreed with the importance of a series of statements. Eighteen statements, covering time, finance, relationships, control and autonomy were proposed for leaving the current position (cost), and pursuing the new opportunity (value), for a total of thirty-six statements. Scale ranged from 1, very un-important to 5, very important. The scenario and questions were pre-tested with doctoral students, a group of business people, and a group of undergraduate students to test for clarity and wording issues. A factor analysis reduced the thirty-six statements to sixteen, nine for opportunity cost (Cronbach of .813) and seven for opportunity value (Cronbach of .644). Composite scores were determined by computing the mean of the answers representing each domain. After rating the thirty-six statements, respondents’ were asked to respond yes or no to the following statement, All things considered, I would pursue this opportunity. In an attempt to capture the respondents’ belief in the law of small numbers, respondents were then provided three text areas and asked to list reasons for their decision (Busenitz & Barney, 1997; Fong, Krantz, & Nisbett, 1986). The explanations were content analyzed and independently scored (Busenitz & Barney, 1997; Fong et al., 1986). If the respondent made no mention of statistical reasoning, but instead relied on subjective means, a 1 was assigned. If the respondent referred to statistical methods or research, a -1 was assigned. If neither was mentioned, zero was assigned. The three scores were then totaled to compute a continuous variable with a range of -3 to +3.

The measure for Illusion of Control was adapted from Simon et al (2000). Respondents rated the extent to which they agree with each of five statements; scale of 1, strongly disagree to 5, strongly agree. The mean of the responses was used as a composite; Cronbach Alpha was .746. The Overconfidence measure was adapted from Busenitz & Barney (1997). Five questions with two possible answers each were provided. One of the two choices is correct, based on the most recent vital statistics report by the National Center for Health Statistics. Respondents were asked to choose the correct answer and then indicate, on a scale of 50% to 100%, the level of confidence they have in their answer. For example, 50% represents a complete guess, 70% represents being correct in 7 out of 10 chances, and 100% indicates total confidence in the answer. Subtracting the percentage of correct responses from the average level of confidence determined the level of overconfidence. New venture decision was a composite of two statements developed for this research. The statements are, I would not be willing to invest in this opportunity (reverse scored) and I would pursue this venture. Respondents were asked to rate the extent to which they agreed with each statement; scale of 1, strongly disagree to 5, strongly agree. The mean of the two responses was used as a composite; Cronbach Alpha was .727. The four item measure of Risk Propensity was taken directly from Gomez-Mejia & Balkin (1989). Respondents were asked to rate the extent to which they agreed with each statement; scale of 1, strongly disagree to 5, strongly agree. The items obtained a Cronbach Alpha of .789 and were combined into a composite measure by using the mean of the four answers. The six item measure of Risk Perception was adapted from Simon et al (2000). After reading the business case, respondents were asked to rate the extent to which they agreed with each statement; scale of 1, strongly disagree to 5, strongly agree. The items obtained a Cronbach Alpha of .834 and were combined into a composite measure by using the mean of the six answers.

RESULTS

In addition to the hypothesized results, a series of post hoc tests were run in order to provide as complete a set of results as possible. Several variables, such as age, risk propensity and number of children, were tested as possible control variables, and rejected. Overconfidence was predicted to influence the decision to pursue an opportunity through opportunity value and opportunity cost, but these relationships did not reach significance. .113 for opportunity value so hypotheses 2a and 3a were not supported. Overconfidence did however significantly reduced Risk Perception β = -.229 (.019), a result
that contradicts both Keh et al (2002) and Simon et al (2000) and it directly influenced the decision to pursue the opportunity $\beta = .189 (.034)$. The illusion of control significantly reduced opportunity cost, $\beta = -.194 (.055)$ and increased opportunity value, $\beta = .237 (.018)$ as predicted, but was not significantly correlated with risk perception, so hypotheses 2b and 3b were supported while 1a was not. Belief in the law of small numbers was correlated with significantly reduced risk perception, $\beta = -.252 (.01)$ thus supporting hypothesis 1b; and it approached, but did not reach, significance in its affect on opportunity value (.093), thus hypothesis 2c was not supported. As expected, belief in the law of small numbers’ influence on the decision to pursue the opportunity was fully mediated through opportunity value and opportunity cost. Risk perception was not significantly correlated with reduced opportunity value, but instead directly influenced the decision to pursue the opportunity, $\beta = -.354 (.000)$, thus hypothesis 2d was not supported. Hypotheses 4a and 4b were supported as opportunity cost reduced the decision to pursue the opportunity, $\beta = -.169 (.05)$ and opportunity value increased the decision to pursue, $\beta = .254 (.004)$.

In summary, overconfidence increased the propensity to pursue an opportunity, both directly and through lower risk perception. The law of small numbers influence on the decision to pursue the opportunity was mediated through lower risk perception. It also influenced higher opportunity value, but did not reach significance. The illusion of control lowered opportunity cost and raised opportunity value, which both significantly influenced the decision to pursue the opportunity. Though this research utilized a limited sample, it confirmed several prior results of the effects of cognitive biases on risk perception while contradicting others. It also confirmed the effect of cognitive biases on the decision to pursue an opportunity and established the existence of the opportunity value and opportunity cost constructs. In addition, it resulted in a preliminary set of statements that can be used as a scale to measure opportunity value and opportunity cost.

LIMITATIONS

While cross sectional survey data suffers from the inability to determine causality, we believe that we are on solid theoretical footing due to many previous studies linking cognitive biases to risk perception and the decision to pursue an opportunity. Surveys are subject to common method bias, but nonetheless are an accepted methodology for collecting data. The two major limitations in this study are 1) the small sample size, as data was still being collected at the time this paper was submitted, and 2) the unknown and un-measurable potential non-response bias due to the data being collected via an anonymous and voluntary on-line survey. The small sample size (n=99), while adequate for some measures (ex. risk perception, decision to pursue, etc.) is not adequate for a factor analysis involving 36 questions, and therefore any results involving opportunity value and opportunity cost must be more fully investigated. On-line surveys, while not perfect, permit quick and accurate data collection from a wide range of respondents while simultaneously reducing the need for resources.

DISCUSSION

The model shown above is important as it extends existing theory concerning an entrepreneur’s decision to pursue an opportunity, and sheds additional light on the effects of cognitive biases. It explains that those with increased levels of cognitive biases typically place higher values and lower costs on opportunities, leading to an increased rate of opportunity pursuit. Aspiring and practicing entrepreneurs need to be aware of cognitive biases, and how these biases may affect their perception of opportunity cost, opportunity value, and risk. Greater understanding of cognitive biases, and their affect on one’s perceptions, may enable entrepreneurs to mitigate some of the inherent risk in pursuing entrepreneurial opportunities, and ultimately reach greater success.

This research could be important to venture capitalist in their dealing with entrepreneurs. VC’s ability to understand how entrepreneurs value opportunities, and decide to pursue opportunities, may permit them to place limits on their own risk in funding ventures. It could also allow VCs (using methods of
decisions making that are complementary to the entrepreneur) to team up with entrepreneurs, to obtain more accurate valuations when pursuing funding for ventures.

If the use of heuristic shortcuts and cognitive biases lead to different valuations than would employment of a more deliberate methodology, one might ask which method is better. As stated “In general, these heuristics are quite useful, but sometimes they lead to severe and systemic errors” (Tversky & Kahneman, 1974: 1124). Will using shortcuts lead to incorrect answers? Is this one of the reason many new enterprises fail? The answer is often, it depends on the situation. Many opportunities arise and must be acted upon quickly; as a slow deliberate method may miss the opportunity altogether. In this case, the rule of thumb heuristics and cognitive biases may allow one to stay in the game, although with less than perfect information. Continual reliance on either methodology: the quick and dirty, or the slow and deliberate, is insufficient. One must work to develop and utilize both methods, applying the proper methodology to the situation. Managers and entrepreneurs need to weigh the cost of bad decisions versus the opportunity lost, and determine which method to employ, and how much time and resources to invest in gathering information for the decision.

It may be that experienced entrepreneurs adjust for these biases; it was noted that expert’s schema were more detailed and elaborate, were less biased, and were more alert to inconsistencies than were novices (Lord & Maher, 1990). This is supported by research which showed that novice entrepreneurs gathered information more from personal sources while experienced entrepreneurs utilized more professional sources (Cooper et al., 1995).

Future Research

In addition to further development of the opportunity value and opportunity cost construct, an area for future research would be examining the extent to which cognitive biases remain fixed over time. Research has shown that training can overcome the impact of some of these biases, (Fong et al., 1986; Russo & Schoemaker, 1992) leading to the question; do serial entrepreneurs differ from one-time entrepreneurs in the development and management of these cognitive biases? In addition, do cognitive biases play a role in the success ratios of entrepreneurs, or enterprise growth rates? Another fruitful area of research would be in the area of corporate entrepreneurial and innovation. Are biases prevalent in these areas? Do cognitive biases differentiate who works in, manages, or in general gravitates to this area? Moreover, do these biases affect overall corporate entrepreneurial success?

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REFERENCES


Figure 1
Cognitive Biases

Overconfidence

Illusion of Control

Belief in the Law of Small Numbers

Risk perception

Opportunity Cost

Opportunity Value

Decision to pursue opportunity

P:1a
P:2a
P:3a
P:4a
P:1b
P:2b
P:3b
P:4b
P:2c
P:2d

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