
PERCEIVED RISKS AND CHOICES IN ENTREPRENEURS' NEW VENTURE DECISIONS

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EXECUTIVE SUMMARY

Though risk plays a central role in most entrepreneurial decision making, little empirical research has explicitly examined how the elements of risk, risk perceptions, and entrepreneurs' propensities to take risks influence choices among potentially risky entrepreneurial ventures. This experimental study asked a sample of entrepreneurs leading America's fastest growing firms to make choices among a series of hypothetical new ventures. The results indicate that such choices are influenced by the risks inherent in the new ventures, as evidenced by the pattern of outcomes anticipated in each venture, the entrepreneurs' differing perceptions of those risks, and differences in their personal propensities to take risks.

The subjects in our sample of entrepreneurs tended not to choose ventures having a high degree of variability in their pattern of anticipated outcomes. This avoidance of outcome variability suggests that the sensitivity analyses commonly prescribed for examining new venture attractiveness may inhibit risk taking, and may deter potential investors from investing in their firms. New approaches to assessing and presenting new venture risk, other than the traditional best case/expected case/worst case approach, may be advisable, as well as sufficiently through market research to provide evidence of the degree to which market acceptance is likely for the venture's products or services.

We also found an effect of differences in risk propensities among entrepreneurs on their new venture choices. This effect suggests not only that entrepreneurs should be wary of any biases they bring to their new venture decisions, but that prospective investors should consider the degree to which entrepreneurs in whom they choose to invest are well-matched to the investors' own risk-taking propensities.

Finally, while our sample of entrepreneurs tended to shun high levels of variability in their new venture choices, they appeared willing to accept a considerable degree of hazard, or possible downside, in their new venture choices, presumably in pursuit of potentially significant gains. Entrepreneurs are advised to seek a clear understanding of the downside entailed in their proposed ventures, and develop strategies to mitigate the likelihood of adverse outcomes. Thus they will not jeopardize chances for near term success and attracting support of investors and others in later stages of the venture or in subsequent ventures.

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Our research did not attempt to examine how our subjects' choices would have played out in terms of performance, but the apparent biases which entrepreneurs' risk propensities bring to their assessment of proposed new ventures is a potentially important issue that merits further scrutiny. On one hand, such biases may lead to patterns of suboptimal decisions. On the other hand, our results suggest that investors should entrust their new venture investments to entrepreneurs whose risk propensities (and perhaps other personal characteristics) best match the needs of both the opportunity at hand and the investor's objectives. As many venture capitalists attest, the management of a proposed new venture should lie at the heart of their investment decision. © 2000 Elsevier Science Inc.

INTRODUCTION

The image of entrepreneurs as bold, forward-thinking risk takers is a part of American business folklore. For entrepreneurs, risk is a central element in a variety of decision contexts, including those dealing with entry into new ventures or new markets (Dickson 1992; Timmons 1994), and new product introductions (Devinney 1992). Indeed, the uncertain nature of consumer and competitive responses to most entrepreneurial decisions makes consideration of risk an everyday task for most entrepreneurs, as well as for investors whose funds make possible entrepreneurs' pursuit of their dreams (Hall and Hofer 1993; Riquelme and Rickards 1992).

Given the significant failure rate among new ventures (Phillips and Kirchoff 1998; Reynolds 1986), and the rapidly changing markets in which today's new ventures are founded (Dickson 1992), a better understanding of risk and its role in new venture decision making has the potential to improve the quality of decision making in the risk-charged environments which most prospective founders of new firms face. Surprisingly, however, little empirical research has explicitly explored the role of risk in entrepreneurial decision making.

Prior research dealing with risk in entrepreneurial settings has focused largely on investors' decisions, and criteria and procedures used to manage investment risk (Sykes and Dunham 1995) and improve the performance of investment portfolios (e.g., Hall and Hofer 1993; Riquelme and Rickards 1992). Only recently have researchers begun to examine entrepreneurial risk-taking from the entrepreneur's point of view. Palich and Bagby (1995) found that entrepreneurs tend to view some business situations more positively than do nonentrepreneurs, perceiving strengths and opportunities where others seek weaknesses and threats. Their work suggests that entrepreneurs do not see themselves as risk takers, but that they pursue opportunities that others do not because they simply view such opportunities differently. Busenitz and Barney (1997) found that entrepreneurs tended to employ heuristics and biases to simplify and speed their decision making in the complex and risky decision environments which typify start-up situations. We extend this line of research into the perceptions and decision-making behavior of entrepreneurs to examine entrepreneurs' perceptions of risk in new venture settings, as well as the choices entrepreneurs make among potentially risky new ventures.

PURPOSE

This paper's purpose is to improve our understanding of both the role and the antecedents of entrepreneurs' risk perceptions in their new venture decisions. Drawing on established traditions in both economics and behavioral decision theory, we first set forth a framework consisting of several factors likely to influence entrepreneurs' risk percep-

tions. This framework shows how these perceptions and other factors are linked to new venture decisions. We then experimentally test portions of the framework.

Our study attempts to shed some light on two specific research questions: 1) What factors lead entrepreneurs to perceive new ventures as risky? 2) Why do entrepreneurs sometimes pursue riskier ventures, and sometimes less risky ones? More specifically, we ask if variability in entrepreneurial risk-taking is due to differences in risk among different ventures, entrepreneurs' differing perceptions of such risks, or differences in the propensity of different entrepreneurs to take risks? Thus, we are concerned in this paper with both risk *perceptions* and risk *propensities* as they influence the risky choice *decisions* of entrepreneurs. In addition to addressing these research questions, our study seeks to build an interval scale of risky venture choices for use in this and subsequent empirical research.

A BRIEF OVERVIEW OF THE ROLE OF RISK PERCEPTIONS IN NEW VENTURE DECISIONS

Previous research involving the notion of risk in business decision-making contexts articulates two distinct views of risk (Fisher and Hall 1969; March and Shapira 1987), each of which holds implications for entrepreneurs' risk perceptions, and by implication, for risky decision making. Additionally, recent research suggests that factors other than the perceived risks associated with the decision alternatives may significantly influence risky choices (Krueger and Dickson 1994; Manimala 1992; Mullins 1996; Sitkin and Pablo 1992).

Drawing on the work of Sitkin and Pablo (1992), we argue that risk perceptions of entrepreneurs, venture characteristics, contextual effects, and traits of individual entrepreneurs play key roles in entrepreneurs' decisions to enter new ventures (see Figure 1). Stage 1 of our conceptual framework argues that managers' perceptions of new venture risks are driven principally by three sets of factors: a) the relative level of investment needed to fund the venture; b) variability in the anticipated outcomes of the venture; and c) any potential losses which may ensue. Perceived new venture risk is expected to be higher for ventures which entail greater investment (investing available capital in fewer larger ventures limits opportunities for diversification, and there is more to lose on a given venture) and for ventures whose anticipated outcomes are either more uncertain (greater variability in anticipated returns) or entail the possibility of greater operating losses (March and Shapira 1987).

Stage 2 of our framework indicates that new venture choices are driven by the risk perceptions and anticipated returns of various alternative ventures, along with differences in personality traits of entrepreneurs considering such decisions, and a variety of other contextual factors. Such contextual factors include resource constraints, the fit of the venture with the entrepreneur's competencies and interest, and various organizational and environmental conditions operative at the time of the new venture decision (Baird and Thomas 1985). Space limitations require that we only develop and empirically test portions of our framework. Thus, in this paper, we focus on an examination of the effects of anticipated new venture outcomes as well as differences among individual entrepreneurs on risk perceptions and risk taking behavior. We choose to direct our attention here because anticipated outcomes lie at the heart of the analysis which entrepreneurs are encouraged to undertake before launching new ventures (Sahlman 1997; Timmons 1994).

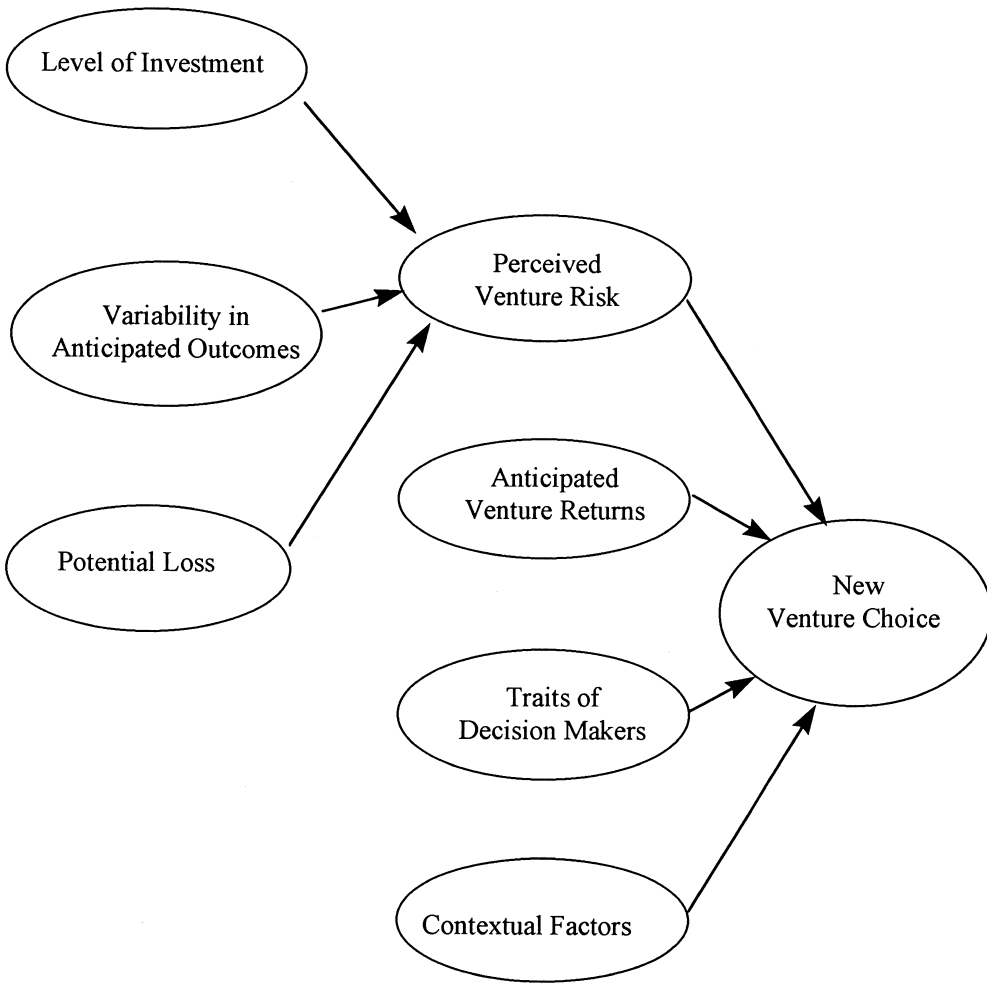


FIGURE 1 A Framework of the Role of Risk Perceptions in New Venture Selection.

Implicit in our model is the notion that entrepreneurs' perceptions of risk and decisions involving risk are distinct and separate cognitive processes. This view is consistent with an abundant body of research into consumer decision-making that judgments about products and services and choices among them involve distinct cognitive operations that do not always work in parallel (cf. Bettman and Park 1980; Johnson and Russo 1984). Examining judgments and choices, or in our case, entrepreneurs' perceptions of risk and their decisions involving risk, as fundamentally different notions may offer new insights into how entrepreneurs view and respond to risk in new venture decision-making.

THEORETICAL DEVELOPMENT

What Constitutes Risk?

Although considerable attention has been devoted to studying the conceptual and operational dimensions of risk (MacCrimmon and Wehrung 1986, 1990; Schneider and

Lopes 1986; Shoemaker 1990), much less effort has been devoted to investigating the dimensions of the risk construct and their influences on risky choice behavior. Risk reflects the degree of uncertainty and potential loss associated with the outcomes which may follow from a given behavior or set of behaviors. Yates and Stone (1992) identify three elements of the risk construct: potential losses, the significance of those losses, and the uncertainty of those losses. In risky entrepreneurial contexts, where losses are almost always possible, it is the significance of any possible losses—or hazard, as we shall refer to it—and the uncertainty or variability of those losses that are likely to be most salient in driving risk perceptions and risky decision-making behavior. The hazard and variability dimensions of risk argue, respectively, that greater potential hazard for a proposed new venture and greater variability in anticipated returns for a proposed venture should lead entrepreneurs to view the venture as riskier than one having less hazard and less variability, all other factors equal. We employ the variability and hazard dimensions to develop our first two hypotheses.

The Variability Perspective and Entrepreneurs' Risk Perceptions

The economics literature typically defines risk as variability (Armour and Teece 1978; Fisher and Hall 1969), arguing that greater variability in economic returns constitutes greater risk. Variability, in turn, is defined as the probability of actual returns or outcomes deviating from the expected return or outcome. For example, investors might assess the risk of investing in a firm in terms of its chances for providing a given return based on the deviations in prior returns (Armour and Teece 1978; Bowman 1980; Fisher and Hall 1969). From this perspective, risk is seen as the possibility that an anticipated level of return will not be realized, and is typically operationalized as the standard deviation of an investment's historical returns.¹

New ventures, by definition, typically do not have a flow of historical returns for entrepreneurs to examine, however, the risk-as-variability perspective may still be germane. Entrepreneurs use a variety of procedures for estimating the likely variability in future returns for proposed new ventures, including critical assumption planning (Sykes and Dunham 1995), risk analysis (Hertz 1964) and sensitivity analysis (Timmons 1994).

Sometimes such procedures are likely to produce rather subjective estimates of both the variability and magnitude of future returns for ventures involving new-to-the-world innovations. However, for less novel ventures, entrepreneurs can often draw on relevant experience gained from similar ventures in the past and produce risk and sensitivity estimates with greater confidence. Thus, the variability perspective suggests the following hypothesis:

H1: The greater the variability in predicted outcomes of a proposed new venture, the greater will be its perceived risk.

The Hazard Perspective and Entrepreneurs' Risk Perceptions

March and Shapira (1987) studied executives' views of risk. They concluded that what the executive perceives as risk is not outcome variability, but hazard—if things go wrong,

¹ Although the standard deviation, as an operational measure of risk, encompasses both the magnitude and the probability distribution of historical returns, the emphasis in this theoretical stream is on the likelihood of achieving outcomes different from the historical mean.

how much can we lose? “A risky choice is one that contains a threat of a very poor outcome” (March and Shapira 1987: 1407).² March and Shapira found that executives, in assessing risk, pay little attention to the probabilities associated with alternative outcomes, for several reasons. First, most managers do not treat uncertainty about positive outcomes as an important aspect of risk. Second, for most managers (and most entrepreneurs), risk is a concept having to do primarily with loss, not with probabilities. A study by Shapira (1995: 45) found that 95% of managers surveyed “described risk in terms of the magnitude of financial loss.” Third, most managers show little desire to reduce risk to a single quantifiable construct.

Although this perspective incorporates the idea of variability in a range of possible outcomes, its emphasis is on the magnitude of potential losses. In a new venture context, March and Shapira’s view leads to the following hypothesis:

H2: The greater the magnitude of a proposed new venture’s largest potential loss, the greater will be its perceived risk.

The Influence of Variability and Hazard in Risky Choice Decisions

Expected utility arguments indicate that decision alternatives having lower levels of perceived risk, whether due to high levels of variability or hazard, should be preferred to alternatives having higher levels of risk, other factors being equal (Yates 1990). Consistent with these arguments, March and Shapira’s (1987) interviews found that managers are likely to avoid choosing decision alternatives for which the chances are high that the expected outcome will not occur. Indeed, Shapira (1995: 57) summarizes the section of his work on organizational risk-taking with the advice of an executive he interviewed: “Avoid risk taking would be my credo.” Thus:

H3A: The greater the variability in predicted outcomes of a proposed new venture, the less likely it will be selected for funding.

H3B: The greater the magnitude of a new venture’s largest potential loss, the less likely it will be selected for funding.

Individual Differences, Risk Perceptions, and Risky Choice Decisions

In a recent review of factors which influence risky business decisions, Sitkin and Pablo (1992: 9) posit that the “risk propensity (of the decision maker) dominates the actual and perceived characteristics of the situation as a determinant of risk behavior.” In the new venture context, this statement suggests that the risk propensity of the entrepreneur making the decision as to which of several proposed ventures to enter is more important than the returns the alternative new ventures are expected to generate, their risks, and most other factors commonly considered in the analysis of such ventures. Sitkin and Pablo’s assertion stands in sharp contrast to the expected utility perspective that dominates research and practice in the new venture decisions area.

Sitkin and Pablo define risk propensity as “the tendency of a decision maker either to take or to avoid risks” (p. 12). Sitkin and Pablo do not argue that all other factors,

² March and Shapira (1992: 172), in a different paper, also acknowledge the variability perspective: “Riskiness is associated with lack of certainty about the precise outcome of a choice and thus with variation in the probability distribution.”

such as those whose effects we hypothesize above, are inoperative. They simply say that individual differences among actors in terms of their risk propensities are likely to explain a greater portion of variance in risky choice behavior. The impact of individual differences is supported by the work of Lopes (1987), who found that some individuals tend to base their actions on the upside of a range of possible decision outcomes, while others tend to act based on the downside. Thus, some individuals are motivated by upside potential, while others are motivated by security.

Recent research by Sitkin and Weingart (1995) has found that differences in risk propensities also influence risk perceptions. Individuals of higher risk propensity will perceive the risks associated with a particular decision alternative to be lower than those having lower risk propensities. Risk perceptions, in turn are expected to influence choices among risky alternatives. Choices among alternatives in a decision set by a decision maker who perceives the set as less risky are expected to be riskier than for those who perceive the set as riskier (Yates 1990). The arguments of Sitkin and Pablo (1992); Sitkin and Weingart (1995); Lopes (1987); and Yates (1990) generate three additional hypotheses:

H4: The greater the risk propensity of the entrepreneur, the less will be the perceived risk associated with a particular new venture.

H5: The greater the risk propensity of the entrepreneur, the more likely he or she will be to select new ventures having higher levels of risk.

H6: The lower an entrepreneur's perceived risk across a set of decision alternatives, the more likely he or she will be to select new ventures having higher levels of risk.

Finally, the argument of Sitkin and Pablo (1992) that risk propensities dominate risky choice decisions, together with Lopes' (1987) theory that risk propensity consists largely of a tendency of individuals to attend to either the upside (i.e., the potential) or the downside (i.e., the hazard) of a situation, suggests that risk propensity should operate on March and Shapira's (1987) hazard conceptualization of risk, rather than on the variability dimension. If this is so, then for ventures of equal expected value, risk propensity is expected to influence choices among ventures which differ in amount of hazard and gain, but not necessarily among ventures which differ as to degree of variability. Based on Sitkin and Pablo's (1992) argument, this effect should be robust across different levels of variability in anticipated venture outcomes. Thus, for ventures of equal variability and expected value:

H7: The greater the risk propensity of the entrepreneur, the greater will be the likelihood of choosing a venture having higher levels of hazard.

METHOD

Design and Procedure

A 2×2 full factorial within subjects experimental design was employed to manipulate the variability and hazard associated with the outcomes of new ventures. We created, through several pretests, a series of descriptions of predicted outcomes for four new ventures (see Table 1). All four ventures have equal expected values, described as meeting the entrepreneur's requirements for return on investment (ROI) for new ventures. Two of the ventures have higher variability (a 40% chance of meeting target ROI with

a 30% chance of being over target and a 30% chance of being under target versus an 80% chance of meeting target ROI with a 10% chance of being over target and a 10% chance of being under target), and two have greater hazard (possible outcomes \$25 million over or under target versus \$5 million over or under). In order to maintain equal expected values for all four ventures, potential for gain above target levels is equal to the potential for loss below target levels for each venture.³

Subjects were presented with a scenario which asked them to imagine that they were about to undertake a new venture. They were presented with the four potential new venture descriptions, and were told that all four were in the same industry, required similar and manageable levels of start-up capital, and that all met their target for return on investment. The ventures were rotated to eliminate possible order effects. The individual venture descriptions were repeated, one per page, on the next four pages, along with instructions for responding to the first dependent measure (see Table 1) provided on each page. This dependent measure, a three item scale, recorded the amount of risk the subject perceived in each venture (page ordering was matched to the venture rotation noted above). Next, a second dependent measure asked subjects to indicate which venture they would choose. Measures of the manipulations' effectiveness were collected next, followed by measures of individual differences and demographic items.

Sample

CEOs of the 540 firms listed in *INC*, *Fortune*, and *BusinessWeek* magazines on their combined 1994 and 1996 tabulations of the fastest growing public companies in the United States were contacted by fax to request their participation in the study. The 210 subjects who agreed to participate in the study (39% of those originally contacted, after three faxed requests) were then mailed the experimental instruments, and asked to return them via U.S. mail, to ensure confidentiality. After five weeks and two faxed reminders, 91 instruments (43% of those who had indicated they would participate in the study) had been returned. After discarding 13 incomplete or unusable instruments, we were left with a remaining subject pool of 78 entrepreneurs.

The entrepreneurs in the resulting sample had founded from 1 to 12 firms (mean 3.0 firms), and ranged from 28 to 66 years of age (mean 47.7). All were male. Their current firms ranged in size from 6 to 10,500 employees (mean 1,186), and \$0.4 million to \$1.2 billion in sales (mean \$147.6 million). Of their current firms, 43.6% operate in

TABLE 1 Mean Risk Statistics and Choices Among the Four Ventures

Venture Name	Level of Variability	Level of Hazard	Mean Risk Score	Standard Deviation	Number of Subjects Choosing Venture
Green	High	High	5.57	1.22	10
Yellow	High	Low	4.53	1.43	3
Purple	Low	High	3.19	1.34	39
White	Low	Low	1.97	0.96	26
					Total 78

Differences between mean risk scores for all ventures are statistically significant (Tukey HSD test) at the 0.01 level.

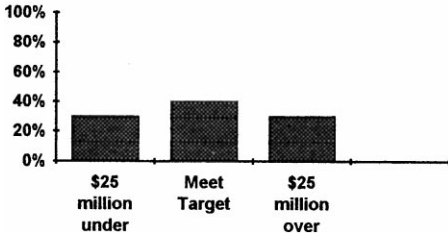
³ Given our criterion that expected values of all four ventures be equal, the ventures having greater hazard also have greater potential for gain. This operational condition permits us to gain insights into Lopes (1987) contention that differences in risk propensity consist largely of a tendency to pay attention to either the upside or the downside of an anticipated set of outcomes.

TABLE 2 New Venture Descriptions

Venture Green

There is a 30% chance of being under target by \$25 million, a 40% chance of meeting target ROI and a 30% chance of going over target by \$25 million. Graphically the distribution appears as:

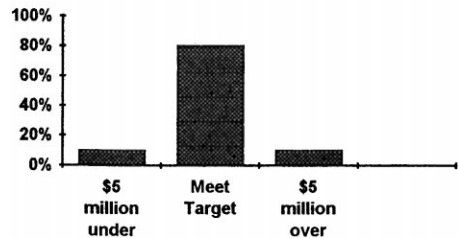
Green's Outcomes



Venture White

There is a 10% chance of being under target by \$5 million, a 80% chance of meeting target ROI and a 10% chance of going over target by \$5 million. Graphically the distribution appears as:

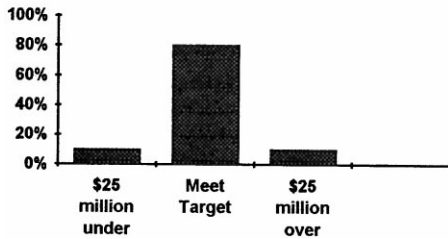
White's Outcomes



Venture Purple

There is a 10% chance of being under target by \$25 million, a 80% chance of meeting target ROI and a 10% chance of going over target by \$25 million. Graphically the distribution appears as:

Purple's Outcomes



Venture Yellow

There is a 30% chance of being under target by \$5 million, a 40% chance of meeting target ROI and a 30% chance of going over target by \$5 million. Graphically the distribution appears as:

Yellow's Outcomes

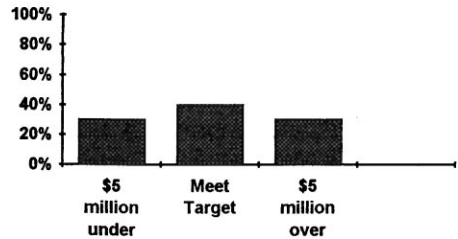


TABLE 3 Scale of Risk Propensity

Please answer the following 5 items by circling the alternative ("a" or "b") you would feel most comfortable with.

- 1 a) an 80% chance of winning \$400, or
b) receiving \$320 for sure
- 2 a) receiving \$300 for sure, or
b) a 20% chance of winning \$1,500
- 3 a) a 90% chance of winning \$200, or
b) receiving \$180 for sure
- 4 a) receiving \$160 for sure, or
b) a 10% chance of winning \$1,600
- 5 a) a 50% chance of winning \$500, or
b) receiving \$250 for sure

TABLE 4 Scale of Perceived New Venture Risk

For each scale below, kindly circle the number which you feel best assesses the amount of RISK associated with this scenario:								
HIGH	1	2	3	4	5	6	7	LOW
MINIMAL	1	2	3	4	5	6	7	EXTREME
VERY RISKY	1	2	3	4	5	6	7	NOT RISKY

manufacturing and 56.4% in service industries. In order to assess any possible non-response bias, we compared firm demographic data for our sample to mean data from the published lists from which our sample was drawn. Firms in our sample tended to be somewhat smaller than those on the published lists, in terms of revenue (mean of \$147.6 million for the sample compared to \$217.8 million for the listed firms) and number of employees (mean of 1,186 compared to 1,753). These data suggest that one should be cautious in generalizing our results to entrepreneurs who lead very large high-growth firms.

Independent Variables

The two manipulated variables were the variability and the degree of hazard (and gain) of the ventures' anticipated outcomes, as described previously (see Table 2). Risk propensity was operationalized using an adaptation of the established (Schneider and Lopes 1986) Risk Style Scale, as shown in Table 3. We chose this measure for our study because it deals with personal propensities toward financial risk taking (as opposed to other kinds of risks, such as those entailed in sky diving) and because of its efficacy in assessing the construct of interest (Schneider and Lopes 1986).

Dependent Measures

The dependent measure of *perceived new venture risk* for hypotheses H1, H2, and H4 was a scale of 3, 7-point items (see Table 4). The reliability of this scale is indicated by a coefficient alpha for a three item scale of 0.956.

The dependent measure of the riskiness of new venture choice for Hypotheses H3A, H3B, H5, H6, and H7 was the subject's selection of one of the four ventures to fund. The mean perceived risk scores for the four ventures indicate that this scale forms an approximately interval scale of the riskiness of the four ventures (see Table 5). As expected, the venture scoring highest in perceived risk (Venture Green: mean perceived

TABLE 5 Manipulation Check Results

Independent Variable	Manipulation Check Mean Values	p Value
Variability		< 0.001
High	3.79	
Low	2.14	
Hazard ¹		< 0.001
High	4.32	
Low	1.97	

Mean values are points on a 5-point scale, with 3 as the midpoint.

¹The manipulation of hazard also manipulated potential gain, in order to maintain equal expected values across ventures (see Table 2). A manipulation check for gain was also significant (means 4.40 and 1.90, $p < 0.001$).

risk score 5.57) is the venture having high levels of both variability and hazard. The venture perceived as next most risky (Venture Yellow: 4.58) has high variability and low hazard. The venture perceived as third most risky (Venture Purple: 3.19) has low variability and high hazard. The venture judged least risky (Venture White: 1.97) is the venture having low levels of both variability and hazard (see Table 5). Pairwise comparisons between the perceived risk scores for all of the ventures were significant (Tukey's HSD test, $p < 0.01$).

Manipulation Checks

The effectiveness of the variability and hazard manipulations was assessed by comparing the mean scores on the manipulation check items (each a 5-point scale) for each venture across the two levels of each experimental condition. As shown in Table 2, all of the manipulations were effective.

RESULTS

Antecedents of Risk Perceptions

A repeated measures analysis of variance procedure (Norusis 1990) was run to assess the effects of variability and hazard on perceptions of new venture risk. Main effects of both variability ($F(1,74) = 307.7, p < 0.001$) and hazard ($F(1,74) = 94.38, p < 0.001$) were found, thereby providing evidence in support of the impact of both the variability (H1) and hazard (H2) perspectives on risk perceptions. No significant interaction was found. To assess the effects of the subjects' risk propensities on the subjects' risk perceptions of each venture (H4), we ran a regression analysis of risk propensity on risk perception. The result was not significant ($\beta = -0.116, p = 0.13$).

Variability, Hazard, and New Venture Choices

Evidence to test H3A, which predicts greater likelihood of choice of ventures having less variability in anticipated returns, is found by comparing the number of higher versus low variability ventures chosen for funding (see Table 1). Thirteen subjects chose the high variability ventures (Ventures Green and Yellow), while 65 subjects chose the low variability ventures (Purple and White). A chi squared test rejects the null hypothesis that these differences are due to chance ($\chi^2 (1 \text{ df}) = 34.67, p < 0.01$), thereby supporting H3A (see Table 1).

Evidence to test H3B, which predicts greater chance of choosing ventures having less magnitude of anticipated losses, is found by comparing the number of high vs. low hazard ventures chosen for funding (see Table 1). Forty-nine subjects chose the high hazard ventures (Green and Purple), while 29 subjects chose the low hazard ventures (Yellow and White). Thus, contrary to the prediction of H3B, entrepreneurs were more likely to choose high hazard than low hazard ventures, presumably to obtain the potential for the greater gains which went along with the high hazard condition. A chi squared test rejects the null hypothesis that these differences are due to chance ($\chi^2 (1 \text{ df}) = 5.13, p < 0.05$).

Risk Perceptions, Propensity, and New Venture Choices

To examine H5 and H6, we ran a regression model in which the dependent variable was new venture choice, and the independent variables were subjects' risk propensity scores and their mean total *perceptions* of risk across the ventures.⁴

H5 predicts a positive relationship between risk propensity and new venture choices. This prediction was supported ($\beta = 0.26$, $p < 0.05$), thereby supporting the prediction of Sitkin and Pablo (1992). The effect of risk perceptions on new venture choice (H6) was also significant ($\beta = -0.19$, $p < 0.05$). Thus, we find both risk propensity and risk perceptions influencing entrepreneurs' new venture choices. Given the inability, in this experimental research, to ascertain the relative "doses" of differences in risk perception brought about by our manipulations and differences in risk propensities of the entrepreneurs in our sample, we can draw no conclusive evidence of the relative importance of one factor compared to the other.

Finally, H7 predicts that, for ventures of equal expected value and equal variability, more risk prone entrepreneurs will choose more risky ventures (i.e., those having higher levels of hazard and gain). For the two ventures having low variability, Ventures White (chosen by 26 subjects) and Purple (chosen by 39 subjects), the results of a logistic regression do not support this prediction ($\beta = 0.067$, $p = 0.74$). Similarly, comparing choices across the two high variability ventures, Yellow (chosen by three subjects) and Green (chosen by 10 subjects), the results of a second logistic regression also fail to support this prediction ($\beta = 2.14$, $p = 0.22$). Though the theories we relied on in developing our study did not predict that risk perceptions would drive these effects, we did include risk perception in the regression models to test H7. The effect of risk perception was significant for the Venture Purple vs. Venture White Comparison ($\beta = -0.648$, $p = 0.04$), but not for the Venture Green vs. Venture Yellow comparison ($\beta = 4.75$, $p = 0.18$).

DISCUSSION

The results provide evidence which extends the work of March and Shapira (1987). Differences in entrepreneurs' new venture choices were influenced not only by differences in the risks inherent in the patterns of anticipated outcomes for different ventures, but by differences in our entrepreneurs' perceptions of those risks, as well as their propensities to take risk. Further, as March and Shapira predict, the degree of hazard in a decision alternative does influence the degree to which entrepreneurs perceive that alternative as risky, though greater perceived risk did not deter our subjects from making risky choices: the entrepreneurs in our study were more likely to choose high hazard than low hazard ventures (63% chose high hazard ventures, which also entailed high gain), contrary to our prediction. Apparently, high hazard ventures are acceptable as long as commensurate gains are sufficiently likely.

On the other hand, entrepreneurs appear to be more apprehensive about variability in possible outcomes, having overwhelmingly chosen ventures low in variability (83% chose either Venture White or Purple). Perhaps they are confident that they can intervene to increase their chances of achieving the desired outcome when probabilities of

⁴ Tests of normality, homogeneity of variance, and multicollinearity were run to ensure that the regression model adequately fit the data (Neter, Wassermann, and Kutner 1990). No heteroskedasticity, lack of normality of multicollinearity problems were found.

unexpected negative outcomes are relatively small. Indeed, a recent study suggests that the overconfidence of entrepreneurs enables them to start new ventures before many of the inherent uncertainties therein have been resolved (Busenitz and Barney 1997). When probabilities of unexpected negative outcomes are large, however, they may feel that they lack the control to bring in the venture on target.

As for risk propensities, as Sitkin and Pablo (1992) predicted, entrepreneurs who have greater risk propensities tend to choose riskier ventures. Interestingly, however, the subjects' risk propensities did not significantly influence their perceptions of venture risks, contrary to the prediction of Sitkin and Pablo. Thus, risk propensity appears to directly impact venture choice behavior, rather than indirectly affecting behavior through the perceptual process. The absence of an effect of risk propensity on risk perceptions is consistent with the findings of a recent study by Palich and Bagby (1995) that found a consistently optimistic pattern of categorization of business situations among entrepreneurs compared to nonentrepreneurs, in spite of no difference in risk propensity among the two groups. It may be that various cognitive patterns and processes of entrepreneurs are more important determinants of entrepreneurial behavior than their risk propensity. Indeed, such processes may constitute unobserved variables in our research that may be responsible for the effects we found. Our finding that risk propensity influences new venture choice behavior, but not risk perception, is parallel to research in consumer choice that judgment and choice tasks involve different cognitive operations (Bettman and Park 1980; Johnson and Russo 1984).

Our results, taken together with previous research findings by Palich and Bagby (1995) and Busenitz and Barney (1997), suggest that better understanding is needed about how entrepreneurs search for and process information about business situations (Cooper, Folta, and Woo 1995; Manimala 1992), and how such information processing influences entrepreneurial behavior. Kahneman and Lovallo (1993) argue that the relative balance between what they call isolation errors (over-optimistic forecasting that ignores the statistics of the past on one hand, and overly timid evaluations of single risky opportunities that neglect possibilities to pool risks on the other) affect the risk-taking propensities of individuals. These and other errors or biases, including the well-known discrepancy (Kahneman and Tversky 1979) between the weights attached to losses and gains in evaluating risky decisions such as new venture opportunities, may explain why we found that hazard in anticipated new venture outcomes influenced perceptions of risk in our study, but did not deter the entrepreneurs in our sample from choosing riskier ventures. Additional research into the cognitions of entrepreneurs may offer additional insights to better explain entrepreneurial behavior.

Finally, our results indicate that the series of four hypothetical new ventures that we used as our dependent measure of new venture risk (See Exhibit 2) constitutes a scale having approximately interval properties (see Table 1). The availability of a valid scale of new venture risk should facilitate future experimental research into the role of risk in new venture decision making.

LIMITATIONS

Our study, like most experimental studies in business settings, suffers from several limitations. First, entrepreneurs in real situations may not behave as did our subjects in the hypothetical situations in which they were placed in our study. Given the likely difficulty, in a field study, of controlling for the broad array of factors which are posited to influence

risky new venture decisions in natural settings, and to separate the effects of risk perceptions from “objective” risk, we elected to conduct an experimental study. This approach has advantages in internal validity for theory testing purposes, but may be criticized on grounds that the experimental task is not a real one with real payoffs. Given the early stage of research in this arena, and given our interest in testing theories, some of which have undergone little empirical scrutiny, we deemed the tradeoff acceptable.

Second, we chose to study decisions among a set of four new venture decision alternatives whose investments and expected values were all equal—such precise equality of investments and expected values across proposed ventures is unlikely in real situations. An additional limitation is the use of a measure of risk propensity borrowed from another literature, a measure which may not adequately capture the propensity of entrepreneurs to take risks in new venture situations. Bromiley and Curley (1992) argue that risk propensities are, to some degree, situation specific, and that measures from one situation may not work well in another situations.

Third, in manipulating hazard we also manipulated gain, in order to preserve the equality of the expected values in the anticipated outcomes of the four ventures from which our subjects were asked to choose. Had we not done so, there would have little motivation for our subjects to choose high hazard ventures (with little prospect for gain), and differences in choices would have been attributable to differences in expected value among the ventures, rather than to differences in risk propensity and risk perceptions, the variables of interest in our study.

Finally, we restricted our examination to only the effects of anticipated outcomes and differences in risk propensity on the decisions that were made. Potentially important contextual factors such as competencies and previous experience of the entrepreneur, incentives, and team decision process issues were not examined in our study. Future research is needed to explore these and other likely influences on new venture decisions.

CONCLUSIONS AND IMPLICATIONS

Our study holds implications for investors who fund entrepreneurial ventures, as well as for entrepreneurs themselves, and for educators who train students hoping to join tomorrow’s cadre of entrepreneurs.

To the extent that potential investors in new ventures behave similarly to the entrepreneurs in our study, the impact of variability in anticipated new venture outcomes on perceptions of risk entailed in, and choices among, new venture alternatives has implications for how entrepreneurs should employ sensitivity analyses and seek to reduce perceived outcome variability as they seek investment capital. High levels of hazard did not deter entrepreneurs from choosing ventures with potentially high levels of gain, therefore, ventures having high levels of variability, such as that often explicitly detailed in sensitivity analyses, were less likely to be chosen. Entrepreneurs may find it useful to find new ways, other than the traditional best case/expected case/worst case approach, to present to prospective investors the likelihood of deviation in future performance from desired outcomes. Our results may offer an explanation of why entrepreneurs are sometimes reluctant to engage in explicit risk and sensitivity analyses for proposed ventures. As Ulrich and Eplinger (1995: 256) suggest, “Often [decision makers] do not want to confront the true probabilities of bad outcomes.” Rather than attempting to mask the outcome variability of presenting new ventures, entrepreneurs may be better

advised to invest in sufficient market research to ascertain the level of market acceptance which the products or services of a proposed new venture are likely to enjoy, or to test the criticality of key assumptions underlying their plans (Sykes and Dunham 1995). Several new techniques of qualitative market research are able to provide tangible evidence of likely market acceptance, even for new-to-the-world products and services, thereby reducing perceptions of outcome variability and helping to build a solid foundation of customer needs on which to erect the new venture (Griffin and Hauser 1993; Griffin 1996; Zaltman 1997).

For entrepreneurs choosing among a set of proposed new venture alternatives, our results indicate that, where levels of investment and the expected values of returns are similar, ventures tend to be chosen based on differences in risk propensities among entrepreneurs, in addition to the risk entailed in the ventures' patterns of anticipated returns. This finding attests to the importance that venture capitalists and other investors place in the people who lead the ventures in which they invest (Heilemann 1997; Sahlman 1997). Entrepreneurs are advised to explicitly ask themselves whether their assessment of proposed ventures they consider are biased in any way by their propensities to take risks. Such biases could result in decisions which lengthen the already daunting odds for new venture success. Various approaches have been identified for overcoming decision biases, including the use of structured decision aids (Ghosh and Ray 1997) and treating a particular decision as an instance of a broader class of similar previous decisions about which outcome information is available (Kahneman and Lovallo 1993).

Additionally, entrepreneurs in search of new venture opportunities should think carefully about strategies for mitigating the hazard they appear willing to accept in search of potentially attractive gains. Failure to adequately understand and plan for adverse outcomes not only may jeopardize chances for near term success, but they may make it more difficult to attract support from investors and others for subsequent financing (Sahlman 1997).

For teachers whose work it is to prepare a new generation of entrepreneurs to make wise choices among new venture opportunities and develop successful strategies to pursue them, our study suggests that providing would-be entrepreneurs with tools, techniques, and analytical frameworks for reducing the variability in their forecasts of new venture outcomes can play an important role in facilitating their pursuit of potentially attractive, but risky, opportunities. Potentially useful tools and techniques include various qualitative and quantitative market research approaches (cf., Griffin and Hauser 1993; Griffin 1996; Mahajan, Muller, and Bass 1990; Zaltman 1997); relevant analytical frameworks include critical assumption planning (Sykes and Dunham 1995) and risk analysis (Hertz 1964). Use of such tools and frameworks to provide a strong foundation of *evidence* on which to build a business plan provides two benefits to students as would-be entrepreneurs: first, stronger evidence supporting the attractiveness of a proposed venture is likely to enhance the likelihood of obtaining funding for the venture; second, as the results of our study suggest (recall that our subjects were more likely to choose ventures having less variability in anticipated outcomes), by eliminating uncertainty and reducing variability in anticipated outcomes, such evidence will make it more likely that the entrepreneur will, given favorable evidence, decide to pursue the venture. This psychological role of such evidence should not be underestimated.

Our results raise questions which call for additional research into the risky choice decisions of entrepreneurs. First, the person versus situation debate in organizational psychology (Mischel 1977, O'Reilly 1991) has wrestled in recent years with trying to

better identify the kinds of situations in which individual differences tend to be relatively more or less important, compared to situational factors, in determining behavior. For risky new venture decisions such as those we have examined here, what situational or contextual factors are likely to moderate the importance of risk propensity and other individual differences in risky choice decisions? March and Shapira (1992) found, in a simulation study, that recent performance outcomes, accumulated resources, and the goals or reference points that decision makers attend to influence risky choice behavior. Baird and Thomas (1985) articulated a model of strategic risk taking which incorporated a broad array of environmental, organizational, industrial, decision maker, and problem variables. Few of these variables have been empirically studied as to their effects on risky choice decision making. These works suggest numerous directions for future empirical research.

How our subjects' venture choices would have played out in terms of new venture performance was not addressed in our study, but the apparent biases which individual differences in risk propensity generate in new venture decision making is a potentially important issue for future research. Viewed from one perspective, our findings suggest that patterns of suboptimal decisions are likely to be common, as managers' inertia (Sitkin and Pablo 1992) and proneness or aversity toward risk (Lopes 1987; Schneider and Lopes 1986) lead to consistently risk-prone or risk-avoiding decisions. Viewed from a more optimistic perspective, however, our results suggest that people matter in such decisions (Hitt and Tyler 1991). Entrusting new venture investments to individuals whose risk propensities and other individual characteristics best match the needs of the market opportunity and a prospective investor's objectives may help improve portfolio performance. The considerable effort which venture capitalists and other investors put forth in evaluating the individuals whose ideas and companies they fund attests to the importance of individual differences, including differences in risk taking propensity, for new firm success.

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