



Uncertainty, risk preference, and new-venture strategies

New-venture
strategies

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Abstract

Purpose – Conventional wisdom holds that the difference between entrepreneurs and managers is large, while uncertainty and risk are virtually interchangeable. Uncertainty and risk are treated as separate constructs and then real-options thinking and prospect theory are drawn upon to determine how they affect the actions of entrepreneurs and managers. The purpose of this paper is to determine specifically, how the above constructs interact to affect the strategies entrepreneurs and managers are likely to adopt when undertaking new ventures.

Design/methodology/approach – The research uses deductive theorizing to build a theoretical model.

Findings – Contrary to conventional wisdom, it is concluded that the difference between entrepreneurs and managers is less than believed, while the effect of the difference between uncertainty and risk is larger. It is determined that entrepreneurs and managers use similar strategies when faced with similar conditions of uncertainty and when they have similar risk preferences. When environmental uncertainty is low, risk-seeking entrepreneurs and managers will prefer licensing, whereas the risk averse will prefer wholly owned new ventures. When environmental uncertainty is neither high nor low, both risk-averse and risk-seeking entrepreneurs and managers will prefer alliances. When environmental uncertainty is high, risk-averse entrepreneurs and managers will prefer licensing, whereas risk seekers will prefer wholly owned.

Originality/value – By separating uncertainty and risk, this research is able to show how their interactions become the drivers of strategic decisions by entrepreneurs and managers. This is new to the literature, and the work thus reveals an opportunity for further sophistication of strategy theory and an opportunity to reduce the barriers between theory on entrepreneurship and management theory.

Keywords Uncertainty management, Risk management, Entrepreneurs, Corporate ventures, Management strategy, Product innovation

Paper type Conceptual paper

1. Introduction

It long has been believed that entrepreneurs and managers are different. Over 30 years ago, Webster (1977) made the case that “independent entrepreneurs” and “administrative entrepreneurs” are different when it comes to risk insofar as the former are risk creators while the latter are risk takers. The independent entrepreneur often is a person who “rushes in where angels fear to tread”. The entrepreneurship and economic literatures have reinforced this theme by explaining that entrepreneurs are people who are willing to bear the risk necessary to bring a new product or service to market (McClelland, 1961). Consequently, conventional wisdom now holds that



entrepreneurs are unafraid of seeking out opportunities that carry risk. While some work has started to appear that questions that belief (e.g. Brockhaus, 1980; Caliendo *et al.*, 2009; Xu and Ruef, 2004), it remains a minority view. The notion that entrepreneurs are comfortable with risk, while managers are not, is so entrenched that it is now incorporated in popular definitions of who these individuals are and within the explanations of what they do. For example, from Webster's dictionary to Wikipedia, entrepreneurs are seen as being individuals who are willing to accept accountability for personal and financial risk in order to pursue a business opportunity. Conversely, risk is not discussed in relation to managers. They typically are described as individuals who manage a business using skills such as planning, leading, organizing and controlling.

Unlike conventional wisdom on the differences between entrepreneurs and managers, uncertainty and risk often are seen as being similar. In his seminal work, Knight (1921, p. 199) explained that "It is a world of change in which we live, and a world of uncertainty . . . [and] . . . If we are to understand the workings of the economic system we must examine the meaning and significance of uncertainty". Some 50 years later, futurists provided compelling evidence that environmental uncertainty was still prevalent and, in fact, technological, economic, social, and political change was increasing at an increasing rate (e.g. Toffler, 1971, 1980). Arguably, that trend has not changed, and we continue to try and divine its effects on business and the way that managers manage firms doing business. For example, Desarbo *et al.* (2005) revisited Miles and Snow's work and looked at the question that is central to business: what is the interrelationship among firm capabilities, environmental uncertainty, and firm performance? Cannella *et al.* (2008) and Waldman *et al.* (2001) addressed leadership and profitability in the context of environmental change. Head (2005) and Alexander (1991) looked at the effects of environmental change on organization structure, and Rajagopalan and Finkelstein (1992) examined the effects of strategy and environmental change on management reward systems. This work continues that theme by asking how does uncertainty affect new-venture strategy? Specifically, what strategies are most likely to be adopted under differing conditions of uncertainty by entrepreneurs and by managers in established firms that are considering developing and introducing new products or new technologies?

Although that question is interesting in and of itself, it remains incomplete. In addition to exploring uncertainty, Knight (1921, p. 233) also laid the foundation for our understanding of risk. He explained that "The word 'risk' is ordinarily used in a loose way to refer to any sort of uncertainty viewed from the standpoint of an unfavorable contingency, and the term 'uncertainty' is similarly used with reference to the favorable outcome; we speak of the 'risk' of a loss, and the 'uncertainty of a gain'". Because uncertainty usually is considered in terms of the environment, it generally is considered to be a macro phenomenon and has been measured by things like rates of change in industry growth (Aldrich, 1979; Keats and Hitt, 1998) or demand uncertainty (e.g. Folta and O'Brien, 2004). Risk, on the other hand, is seen in terms of risk to the organization and managers' perceptions of that risk. For example, Sitkin and Pablo (1992) theorized that risk behavior (decision-making) is determined by perceived risk and by risk propensity, which is determined by risk preference. Later, Sitkin and Weingart (1995) empirically showed that decision-making behavior was determined by perceived risk and problem framing which, in turn, was a function of risk propensity.

This work follows the normal format for a conceptual paper. First, we establish the main constructs, along with underpinning assumptions and boundary conditions. We then construct our model by explaining the causal relationships between the independent variables, uncertainty and risk preference, and the dependent variable new-venture strategies for entrepreneurs and managers. To help explain the effects of uncertainty, and to provide a theoretical basis for developing the causal relationships, we draw on thinking in real-options theory. The theory addresses the relationship between investments in things like new-product development, and includes not only environmental uncertainty but also the reality of loss of investment. We also draw on the logic contained in prospect theory and in agency theory to help explain why managers take the actions that they do. The rationales contained in real-options thinking and prospect theory permits parsimony in discussion. We conclude with a summary of the main conclusions and their implications for theory and practice.

2. Background and constructs

Investment in innovations under conditions of uncertainty means that the outcome is unknown. The investment may be lost, returned, or returned with profit. While loss is limited to the investment, the upside can, in theory, be unlimited. As uncertainty increases, so does the potential for gain. That relationship was first established in the finance literature on options and then in the strategy literature on real options, which include investments in innovations such as new goods, services, and technologies. Real options typically are treated as though they have properties similar to American call options (Trigeorgis, 1991) whereby an investment is made that secures the option to strike (i.e. purchase the underlying asset). There are, however, some significant differences. First, real options refer to the investments that are made in physical, technological, organizational, or human resources, and largely are seen as irreversible (Dixit and Pindyck, 1994; Sick, 1990). Second, it has been argued that there is no expiration date for striking real options (Sick, 1990); this constitutes a strong-form of the real-options argument because investments in skill-based assets will lose value if the skill is not used and allowed to atrophy, but there is a valid point being made that, unlike financial options, there is no specified cut-off date for a strike. Third, and also unlike their financial counterpart, an investment in a real option can act as a platform for further, compounding investments (Bowman and Hurry, 1993; Kogut and Kulatilaka, 1994) up to and including the final investment (the strike) that leads to commercialization.

Within real-options theory, uncertainty is not an absolute condition. It comes in degrees and includes both primary and secondary uncertainty – unknown unknowns and known unknowns. Both types apply in this work. As uncertainty increases so too does the potential payoff from the option, which directly translates into increases in firm value (Myers, 1977). That does not mean that an increased payoff and increased firm value is automatic. When uncertainty is high there are benefits to be gained from waiting for additional information on product demand, the direction of technological development, and so forth, before deciding whether or not to make a subsequent or striking investment (Bowman and Hurry, 1993; Dixit and Pindyck, 1994; Trigeorgis, 1991). Conversely, when there is little or no uncertainty and the environment is predictable there is no value to waiting and the option investment and strike can be simultaneous.

Since that work, there has been empirical research that has sophisticated our understanding of the relationship between uncertainty and investments in real options. Folta (1998) split uncertainty into exogenous (environmental) and endogenous (firm specific), and concluded that the former is important insofar as it increases the importance of waiting for more information whereas the latter increases the importance for compounded investments. In this work we have elected to hold endogenous uncertainty constant, which means that compounding is still an important tactic but difficulties created in using it because of internal uncertainties are eliminated from the model. Folta and Miller (2002) extended knowledge on uncertainty and investment in real options with results from an analysis that showed that low uncertainty increased the likelihood of investments in equity buyouts of partners, but that the existence or potential for competition was important insofar as competition increased the likelihood of early buyout in the face of uncertainty, as did the existence of non-proprietary technology. Miller and Folta (2002) found that optimal timing for exercising real-option acquisitions not only depended on possibilities for preemption, and whether or not the technology was proprietary or shared, but also on current dividends and whether or not the option was simple or compound.

In this early work Folta and colleagues had measured uncertainty in a way that was impacted by both endogenous and exogenous elements, so Folta and O'Brien (2004) elected to solve that problem by looking at its effect in terms of demand uncertainty (external) alone. They found support for a non-monotonic effect of uncertainty – the rate of entry into an industry, which constitutes real-option investments, first decreases with increases in demand uncertainty and then increases. This finding amplifies the importance of considering both the option to defer and the option to grow when contemplating entry. That sophistication of using demand uncertainty is a valuable contribution to the literature, and although it should be indicative of economic uncertainty, the effects of other aspects of environmental uncertainty (technological, sociological, political, demographic, global) were not included. Until the effects of all these drivers of environmental uncertainty have been determined, we elect to treat the phenomenon in the conventional linear form and as ranging from low to high.

Knight (1921) discussed at some length the importance of the “business man” being able to establish the probabilities associated with risk, either in terms of “a priori” probability, which can be mathematically determined, “statistical” probability, which can be empirically determined, or as estimates that are judgments or perceptions of managers. As already noted, today, risk typically is defined as managerial or organizational. Palmer and Wiseman (1999, p. 1043) explained that strategic-management research often has assumed that managerial risk-taking is isomorphic with organizational risk when, in fact, it is not. They define managerial risk-taking in terms of “proactive strategic choices involving the allocation of resources” and organizational risk as “income stream uncertainty”, and go on empirically to show that there is a distinction between the two. Yet a third conceptualization of risk, which is implicit in these other definitions, is probability \times consequence. As Reed *et al.* (1997) explained in their systems-theory analysis of the cleanup process at the nuclear-weapons complex with all its associated risks, this thinking on what risk includes made its way into management theory via engineering. In business, probability is driven by a wide range of factors that are firm-specific and non firm-specific, while consequence typically refers to the single

issue of making a loss. In other words, and in the case of a new venture, what is the probability of losing the investment? We have elected to use this latter conceptualization of risk because of its utility in model building – by holding probability constant, the investment (consequence) equates to the risk. Thus, for a given probability, a larger investment means greater risk. In addition, and, again, as already noted, we are concerned here with the way risk affects decisions on the best way to capitalize on innovations, which brings into play strategic decision-making and the decision maker's risk preference.

Tyler and Steensma (1998) found that executives' perceptions of their firm's willingness to take risk affected their decision-making on strategies. Firms that were perceived by managers to be more risk seeking resulted in less credence being given to threats associated with strategies than those that perceived their firms to be risk averse. That fits with the finding that decision-making behavior is determined by perceived risk and problem framing which, in turn, was found to be a function of risk propensity that was driven by outcome history (Sitkin and Weigart, 1995). These findings also fit closely with prospect theory, which makes the case that an individual's risk propensity changes according to achieved performance relative to target performance (Kahneman and Tversky, 1979; March and Shapira, 1987). When individuals are near or above target performance they tend to be risk averse, but when they are below target they tend to become risk seeking. Prospect theory also contends that if an issue is framed negatively, through either experience or in terms of the information that is provided to the individual making the decision, then that individual has a tendency to become more risk averse than if it is framed positively. In this work we hold history and information constant.

There exists empirical work that shows that entrepreneurs (Webster's, 1977, "independent entrepreneurs") may not be more risk-seeking than the general population (e.g. Brockhaus, 1980) – some are willing to carry risk, while some are not and will avoid it. Wu and Knott (2006) explained how entrepreneurs could be risk seeking and risk averse. They theorized and empirically confirmed by studying *de novo* entry into the banking industry that entrepreneurs are risk seeking with regard to ability (cost) uncertainty, but can be risk averse with regard to demand uncertainty. Xu and Ruef (2004) found that "nascent entrepreneurs are more [financially] risk-averse than non-entrepreneurs". They reconciled this problem of financial risk-aversion by suggesting that motivations for founding business ventures can be non-financial in nature. From a large-sample survey of German households, Caliendo *et al.* (2009) found that individuals who are not risk averse tend to become entrepreneurs, but that is only true for people coming out of full employment. They concluded that entrepreneurs could be risk averse or risk seeking.

A rationale for why managers (Webster's, 1977, "administrative entrepreneurs") would become risk seeking or risk averse can be found in agency-theory. Amihud and Lev (1981, p. 607) explained that managers' income from their employment typically constitutes a large part of their total income, so that "income is closely related to the firm's performance through profit-sharing schemes, bonuses, and the value of stock options. . . [which means that] . . . the risk associated with managers' income is closely related to the firm's risk". Wiseman and Gomez-Mejia (1998, p. 139), who explored this issue of remuneration and risk taking within the context of agency theory, explained that when managers bear too much risk they will become risk averse and "seek to

reduce uncertainty in firm performance when their compensation is closely linked to that performance”. However, managers’ income is not all that is at stake. As Amihud and Lev (1981, p. 607) also explained “Quite often, a firm’s failure to achieve predetermined performance targets ... will result in managers losing their current employment and seriously hurting their future employment and earnings potential”. In other words, managers have employment capital (Fama, 1980) tied up in their ability to make the firm perform to some predetermined or expected level. Therefore, when performance targets are met, managers’ income and employment capital are safe and, in line with prospect theory, they will tend to be risk averse. When performance is below target both their income and employment capital are in jeopardy and they will tend to be risk seeking.

Clearly, the issue of risk and its effects on strategic decisions is complex. Here we adopt the view that while entrepreneurs and managers are different insofar as one is taking an idea to establish a new business venture and the other is operating an established business in which new ventures are undertaken, they both can be risk averse or risk seeking, but for different reasons. The important question is what that means for the actions they take to bring a new venture into being in the face of differing amounts of uncertainty. This effect of the interaction between risk and uncertainty has been ignored in the extant literature and is at the core of the following model.

3. The model

Figure 1 shows the relationship between environmental uncertainty and the preferred strategies for risk-averse and risk-seeking entrepreneurs, be they “independent” or “administrative”. In the following discussion, we provide rationales for why it is the interaction between uncertainty and risk preference that determines the preferred strategies of both entrepreneurs and managers. The strategies we discuss include wholly owned new-venture development, either as a new organization or as a new venture within an existing organization, along with alliances and licensing. The recognition of these three approaches to establishing new ventures goes back to Gartner’s (1985) work where he noted that the Strategic Planning Institute recognized a new, independent entity, a profit center in an established organization, or an alliance as being new-venture forms. In providing a conceptual framework for new-venture

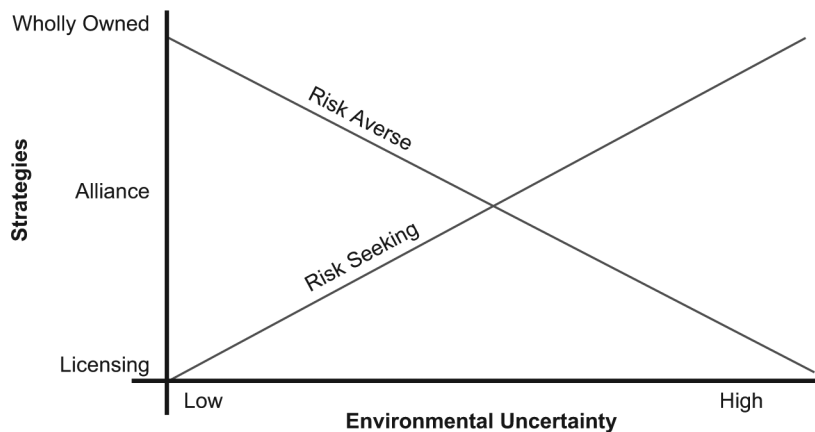


Figure 1.
Uncertainty, risk, and
new-venture strategies

creation, Gartner also added licensing. These three forms – independent development that is wholly owned, alliances, and licensing – are particularly interesting because they carry different amounts of risk. If we hold probability constant, and use failure in the form of loss-of-investment as the consequence, then, for any given innovation, there exists a monotonic pattern with independent development being the most risky because the investment is borne by one party, followed by alliances where the investment can be shared, and lastly by licensing where, typically, much of the investment cost is passed on to others.

3.1 Risk averse

All else being equal, risk-averse entrepreneurs prefer conditions of low demand-uncertainty (Wu and Knott, 2006)[1]. In Knight's (1921) terms, that means that they will prefer conditions that permit identifiable (a priori or statistical) outcomes, rather conditions that require the need to make "subjective estimates of outcomes". Wu and Knott (2006) also tested the effects of entrepreneurs' confidence in their own abilities and found that it can offset the effects of demand (environmental) uncertainty. As Koelinger *et al.* (2007) found in a multi-country study, there is a negative relationship between entrepreneurs' confidence in their own abilities and failure. Thus, most people are overconfident in their abilities. Under conditions of low uncertainty, this overconfidence will permit even the risk averse to conclude that they can be successful and, thus, they will elect to create a wholly owned new venture.

According to Wu and Knott (2006) and Koelinger *et al.* (2007), there also exist individuals with a realistic assessment of their own abilities. For this group, they likely will question whether or not they have the skills to out-compete others that already are in the market or that may enter. Because low uncertainty means that others will be attracted to what is a clear opportunity, returns will be competed away. Low or poor returns does not mean failure, so a wholly owned new venture will still be a logical strategy to use, but it will lead these risk-averse entrepreneurs to reduce the consequence to themselves by seeking funding from sources such as private equity rather than bootstrapping the new venture. As environmental uncertainty increases, then wholly owned ventures, even with alternate funding, would become less attractive. Baum *et al.* (2000) found for a sample of biotech startups that alliances provide access to information, new capabilities, opportunities for learning, and lead to enhanced performance. Those benefits provide the "insurance" against risk (Knight, 1921) that will keep the risk-averse entrepreneur involved in the venture. However, as uncertainty continues to increase, these entrepreneurs eventually will shun any direct involvement. That means that, at the extreme when confidence in their own abilities is outweighed by environmental uncertainty (Koelinger *et al.*, 2007), they will favor selling or licensing any intellectual property.

Much of the rationale provided for the adoption of strategies by independent entrepreneurs carries through to managers in established companies. For the risk-averse manager that has been meeting performance targets, low uncertainty means that outcomes from new product introductions, developments of new technologies, and so forth, are predictable and the potential for generating profits can be calculated with some degree of accuracy. If a manager's assessment of a firm ability follows the same pattern as entrepreneurs' assessments (i.e. overconfidence), then the risk attached to the wholly owned strategy will be deemed acceptable. Even

with a realistic assessment of firm abilities, when low environmental-uncertainty means that returns are low, managers will still opt for whole ownership of a new venture. As long as the project does not destroy economic value, managerial income and employment capital will remain safe, and a new venture that is wholly owned by the firm demonstrates that the managers are willing to pursue new opportunities. Like the independent entrepreneurs discussed above, as uncertainty increases, risk-averse managers likely will hedge by using alliances to offset the consequence of failure by gaining access to capabilities not possessed by the firm. That not only provides a source of income, but managers also can claim access to new capabilities (Mowery *et al.*, 1996). And, again, at the extreme of high uncertainty, risk-averse managers likely will sell or license any underpinning intellectual property because that generates income without undertaking a potentially loss-making venture and putting their own income and employment capital in jeopardy. Thus:

- P1.* For risk-averse entrepreneurs and managers, as environmental uncertainty increases from low to high, wholly owned new ventures will give way to alliances and then to licensing.

3.2 Risk seeking

From Wu and Knott (2006) we know that entrepreneurs that have a high opinion of their own capabilities are willing to accept high demand-uncertainty. Arguably, the confidence they exude in their abilities will permit them to seek out opportunities with high returns while discounting or underestimating the associated probability of failure. We hypothesize that these risk-seeking entrepreneurs are not likely to be interested in wholly owned new ventures where there is low uncertainty and consequent increased competition and reduced returns. Instead, they will elect to pass on this opportunity and license or sell any intellectual property they own to garner funds that will allow them to pursue prospects with higher potential returns. Real-options theory predicts that they also will see the potential for substantial gains from the high environmental-uncertainty – as noted earlier, the higher the uncertainty, the greater the value of an option (in this case, the value of the new venture). Correspondingly, and because they are risk seeking, these entrepreneurs will strive to establish a startup venture where the potential returns are greatest. With a risk-seeking, winner-take-all mentality, they may seek to bootstrap a new venture themselves but, in between, where uncertainty is not as high and potential returns are somewhat diminished, an alliance will help keep their funds free for other opportunities. An alliance also can provide the opportunity for sale of the venture (to the alliance partner) thus allowing the entrepreneur to move on to the next high-return (and high-risk) project.

From the central thesis of prospect-theory, we can deduce that risk-seeking managers, who will be looking to overcome threats to income and employment capital, will pursue new, higher-yielding strategies because the old ones were not working. That means that they will shun the low yields associated with ventures with low uncertainty and consequent competition, and will sell or license underlying intellectual property to generate funds that can be used in projects with potentially higher returns. Thus, like the risk-seeking independent entrepreneur with the winner-take-all mentality, risk-seeking managers will prefer new ventures with higher uncertainty and a higher (real-options) value because they need to demonstrate the ability to undertake a winning strategy. Between the two extremes, we again hypothesize that an alliance

will be favored because the returns may not be as great as ventures with high uncertainty, and an alliance provides the opportunity to sell out to the alliance partner and thus generate funds that can be used in higher-return projects. This leads to the proposition:

- P2.* For risk-seeking entrepreneurs and managers, as environmental uncertainty increases from low to high, licensing of innovations will give way to alliances and then to wholly owned new ventures.

4. Discussion

We have separated uncertainty and risk as distinct constructs. Consistent with Knight (1921) we have argued that environmental uncertainty is not just a source of threats but also can provide opportunities. The concept of risk – the risk of undertaking a new venture – is a function of individuals' risk preferences, which then affects their decisions on strategy. For risk-averse and risk-seeking entrepreneurs and managers, we have argued that this interaction between uncertainty and risk preference leads to identifiable patterns of strategy. We deduced that having a wholly owned new venture is preferred by risk-averse entrepreneurs and managers when uncertainty is low, but for risk seeking entrepreneurs and managers it is preferred when uncertainty is high. The reverse is true for licensing – the risk averse prefer it when uncertainty is high but risk seekers will use it when uncertainty is low – and the use of alliances is a compromise that works best with medium levels of uncertainty for both the risk averse and risk seeking.

The implications of this are important for scholars predicting the strategy-performance relationship. While uncertainty has been taken into account when looking at strategy and performance (Keats and Hitt, 1998), the impact of the decision-makers' risk preference and its interaction with uncertainty generally has not and, as we have demonstrated, that has implications for both a strategy's returns and probability of failure. That means that the research assessing performance for new-venture strategies may have understated the explained variance in performance. It also is important for providers of private equity for entrepreneurial new ventures and to stockholders in established firms that are undertaking new ventures. The relationship among uncertainty, risk preference, and the returns yielded by the adopted strategy is fixed. That means that as entrepreneurs and managers seek to maximize the benefits to themselves, it creates a cost elsewhere. By selecting new-venture strategies that best suit their own needs, entrepreneurs and managers may benefit but any sub-optimization in returns or increased risk of loss is transferred to investors.

While adopting a prospect theory rationale to help explain behavior, we held previous experience and information constant. When the model presented in this work is empirically tested, the previous experience of entrepreneurs and managers, along with the availability of information on an opportunity, and whether or not that information frames the opportunity in a positive or negative way, need to be taken into account. Other factors, such as organizational risk-taking (Tyler and Steensma, 1998) need to be controlled for, along with factors not discussed in this work, such as the quality and quantity of resources to which both entrepreneurs and managers have access, as do things like cultural fit in alliances, industry norms for new venture creation, and extant competition (Folta and Miller, 2002; Miller and Folta, 2002).

Beyond that, we believe the model has external validity and should hold under conditions of uncertainty, such as that found in domestic markets versus foreign.

This work refines thinking on differences between entrepreneurs and managers and on the difference between uncertainty and risk. It shows that the former is less important than thought and the latter is more important. Thus, theory on entrepreneurship may be readily transferable to managers and their behavior, while management theory dealing with actions in established firms may be readily transferable to new entrepreneurial ventures. Also, future research needs to measure not only environmental factors but also behavioral factors. That means undertaking the difficult task of multi-level research.

Note

1. In addition to the empirical evidence on entrepreneurs being risk averse, there is substantial anecdotal evidence. For example, a recent article by Gladwell (2010) in the *New Yorker* magazine discusses how well known entrepreneurs have avoided or minimized the downside potential of strategies that appear risky. For example, Ted Turner, who inherited a billboard company, reduced the chances of failure of his initial move into television in Atlanta by using tactics such as advertizing the TV channel on unused billboard space and by being willing to air NBC programs that were not being shown by the main NBC affiliate in the region. Such tactics act on the probability of failure rather than the consequence. Given that the range of such tactics are limited only by the imagination of the entrepreneur (or manager), we have held probability constant and, instead, focused on the impact of consequence.

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