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Competitive Moves: The Influence of Industry Context and Individual Cognitive Factors

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Abstract: Businesses compete in markets with significant uncertainty and choose disparate competitive strategies. Some attack while others appear to wait. While real options logic has been used to explain market entry and exit decisions under uncertainty, few have tied this logic to the characteristics of ventures' competitive moves. This paper discusses how ventures launch competitive moves, particularly the speed and intensity of action, under contrasting conditions of exogenous uncertainty and first-mover advantage. We argue that the speed and intensity with which entrepreneurs conduct competitive activities are contingent on both their perceptions of the environment and their level of certain cognitive biases. We conducted a two-by-two within-subjects design experiment to test our hypotheses with a sample consisting of service industry professionals.

Keywords: competitive actions, first-mover advantage, uncertainty, cognitive biases, real options

1 Introduction

Entrepreneurship research concerns the founding, survival, and growth of new ventures. Research suggests that new ventures are created following a dynamic process consisting of a wide range of actions such as developing/acquiring technology, engaging in product development, test-marketing products, and entering markets (Galbraith 1982; Hansen and Bird 1997). Consequently, the competitive activities of new ventures are of paramount importance in determining their organizational outcomes (Aldrich 1999; Delmar and Shane 2004).

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The strategies chosen by firms are affected by perceptions of the environment (Droege and Marvel 2009). Bird (1992) proposed that individuals respond to environments by creating temporal expectations (called brackets) that describe the expected pacing (elapsed time) from one event to the next. According to Gersick (1994), when deadlines are present and leaders have control over events, time-based pacing is used. However, when events are uncontrollable, event-based pacing is used, which means that whether subsequent actions can or should be initiated is contingent on the clarification of special events or condition signals emanating from the environment. Event-based pacing is particularly important in this context as entrepreneurs and other business leaders are often required to make decisions under conditions of uncertainty upon which they have limited control (Cyert and March 1963; Simon 1947).

Examples of such events include among others, change in market demands, passage of legislation, and technological change. Since the as yet undetermined outcome of these events may either positively or negatively influence the ability to successfully pursue opportunity, business leaders will (in the face of such uncertainty) tend to preserve strategic flexibility (Hayes and Garvin 1982) in order to maximize the expected return from their investment. One method of maintaining flexibility is to hold options open to reduce potential losses as much as possible (Bowman and Hurry 1993). For example, domestic firms with international growth aspirations exhibit real options logic when in the face of market uncertainty they enter a Joint Venture (JV) as opposed to a full acquisition (Buckley and Tse 1996; Folta and Miller 2002). The JV requires a smaller upfront investment, thus providing the firm with an option to cut losses (capped at the JV investment) or to increase investment later if significant demand develops.

Option value is modeled mathematically in the Black–Scholes option-pricing model (Black and Scholes 1973) and is particularly sensitive to volatility. Not surprisingly, decision-makers estimate more option value when they perceive high environmental uncertainty (Duncan 1972). While it is rare for managers to explicitly utilize real options theory when making investment decisions (Copeland and Keenan 1998), evidence suggests that the delaying predictions derived from real options logic tends to accurately predict what decision-makers do when faced with discretion, uncertainty, and sunk costs (De Falco and Renzi 2015; Kogut and Kulatilaka 2001).

The speed and frequency in which firms launch competitive moves are critical parameters in assessing their likelihood of success. Likewise, the confluence of macro-level and micro-level factors that influence firms' competitive moves have important implications in understanding firms' flow of logic in

deciding strategic actions. However few studies in the entrepreneurship literature have addressed these issues. This paper draws from real option theory to investigate how two disparate industry characteristics, *exogenous uncertainty* and *first-movers advantage (FMA)*, are likely to affect a venture's competitive moves. In particular, we examine two resultant characteristics of firms' competitive actions: *speed of action* and *intensity of action*. We then detail how the cognitive processes of business leaders moderate the relationship between these industry factors and the ventures' competitive actions.

We contribute to: 1) real options theory, by examining the boundary conditions and contingencies that may influence decision by business owners or managers to launch competitive moves; 2) entrepreneurship and strategic theory, by revealing the relationship between various industry and personal factors that affect the decision to pursue competitive moves and; 3) entrepreneurial practice, by explaining to potential entrepreneurs and other business leaders, the effect these factors have on the strategies chosen to address conditions that arise.

The paper proceeds as follows. We discuss the literature related to risk and uncertainty and then competitive moves. Next, we introduce the model and develop the hypotheses. This is followed by the methods, results, conclusions, limitations, and contributions.

2 Risk and Uncertainty

Most business decisions involve management of events with uncertain outcomes due to unanticipated events in a firm's environment (Schumpeter 1934) and the limited information-processing capabilities of human beings (Simon 1947), thus making it nearly impossible for outcomes to be known in advance with certainty (Cyert and March 1963). Events with uncertain outcomes can involve either *risk* or *uncertainty*. A decision involves *risk* when all possible outcomes are known, and the probability of each outcome is known (Wald 1950), but which outcome will happen in a specific scenario is unknown. A decision involves *uncertainty* if the outcomes are not known or the probabilities of the outcomes are not known. Decision-makers are often faced with uncertainty because of limited access to information, but how decision-makers accept or bear uncertainty helps to define them. For example, Knight explicitly argues that entrepreneurs (vs non-entrepreneurs) willingly bear uncertainty in pursuit of profit. Knight's theory focuses on the individual's decision-making process; he argues that business owners frequently face uncertainty in

business, whether it be forecasting consumer demand or cost, and that profit is derived from this uncertainty (1921).¹

Dixit and Pindyck (1994) specify differences between what they term technical uncertainty (largely endogenous) and input cost uncertainty (largely exogenous). Endogenous uncertainty is largely within the entrepreneur's control and therefore is reducible through efforts. For example, entrepreneurs can lessen endogenous uncertainty through the development of new technology, human capital, and capabilities. When this is possible, the option to proceed immediately can be more valuable than holding the option to proceed later and as such, may encourage the firm to proceed. On the other hand, exogenous uncertainty is outside the entrepreneur's control and therefore is largely irreducible. For example, if passage of a law will significantly affect the new venture, and the entrepreneur has limited influence through lobbyists or other methods, whether or not the law will pass is an exogenous uncertainty.

When faced with uncertainty, business leaders need to decide whether to proceed or wait until the uncertainty is resolved. Taking the next step in launching a product or venture involves a significant commitment of time and resources, resulting in significant sunk costs. While some of the knowledge and experience gained, as well as portions of the development work may be salvageable, a failed business or product launch most often results in significant loss. In view of the irreversibility of a new venture start-up, or a new product launch, rising levels of exogenous uncertainty should increase the value of holding such options. Because exogenous uncertainty transpires largely independent of any one organization's activities, the firm may be better off waiting for new information before committing to the next stage (Li 2008).

3 A Model of Entrepreneurial Competitive Action

A competitive move is defined as a market-oriented action newly launched by a firm that threatens the demand-supply status quo of the market (Chen 1996; Ferrier 2001). Chen (1996) conceptualized a firm's competitive moves in terms of attack/response dyads: an attack is aimed at acquiring rivals' market share;

¹ For a comprehensive review of the assumptions and limitations of three influential contributors to the theory of the entrepreneur (Schumpeter, Kirzner, and Knight), please see McMullen and Shepherd (2006).

while a response is developed to defend or improve a firm's own share in response to the attack of its rivals. Research suggests that these competitive moves are important in determining the outcome of competition (Miller and Chen 1996) and that firms count on successful competitive attacks to generate economic rents (Chen 1996). Accordingly, a new entrant (a challenger) in an industry may utilize competitive attacks to overturn the market position of incumbent firms (Ferrier, Smith, and Grimm 1999). The ability of a new entrant to capture market share and maintain the competitive initiative may force their competitors to respond and thus take a reactive role (Chen 1996; MacMillan 1982). Therefore, firms may aggressively build competitive advantage by strategically launching competitive attacks.

Entrepreneurship research focusing on the venture creation process indicates that the timing of undertaking actions plays a key role in determining the success of a venture (Delmar and Shane 2004). Schumpeter (1934) suggested that a high speed of action generates high payoffs, and research has provided empirical evidence linking the speed of action to enhanced performance of organizations (Ferrier, Smith, and Grimm 1999). Accordingly, this paper conceptualizes *Speed of Action* as a key construct in the process of launching products and ventures.

By intensely launching competitive moves, a firm may quickly build its internal assets such as those of technology and human capital, and as a result, may capture the market share of rivals. Accordingly, scholars posit that a firm's action intensity, or the number of competitive moves a firm conducts in a certain period of time, may positively affect its competitive advantage (Young, Smith, and Grimm 1996). We argue that frequency, or the *Intensity of Action* is another key construct in the entrepreneurial competitive process.

While high degrees of speed of action and intensity of action may positively influence firms' performance, firms do not always launch competitive moves quickly and intensely. Prior research has provided some insights in this area. Chen and MacMillan (1992) found that firms' market dependence and irreversibility of action delayed competitive moves. Conversely, Chen and Miller (1994) found that visibility of attack and centrality of market attacked increased firms' number of competitive actions. The major limitation of this stream of research is that it has focused on large incumbent firms as opposed to new entrants or small firms. We argue that understanding the joint impact of industry characteristics and individual-level characteristics on the speed and intensity of competitive actions of small ventures is an important question for both entrepreneurship and strategy research. We propose the following model (see Figure 1):

Figure 1: A model of entrepreneurial competitive action.

3.1 Environmental Uncertainty and Entrepreneurial Competitive Action

A market with uncertainty tends to behave in ways that are difficult to understand as uncertainty exerts significant influence on organizational processes and outcomes (Miller and Chen 1996; Sutcliffe and Zaheer 1998). One manifestation of uncertainty is highly variable, or uncertain, returns (Lubatkin and Chatterjee 1994). While McGrath (1999) suggests that high variance with the ability to limit downside uncertainty should lead to increased entrepreneurial activity, most existing theory (e. g. Dixit 1992; Pindyck 1991) and empirical evidence (e. g. Campa 1993; O'Brien, Folta, and Johnson 2003) suggests that high uncertainty generally dissuades investment. In other words, high uncertainty sets a high threshold against venture creation activity. Interestingly enough, while several studies have reported an inverse relationship between uncertainty and firm investment levels (e. g. Guiso and Parigi 1999; Huizinga 1993), others report weakly negative or no relationship (e. g. Campa and Goldberg 1995; Driver, Yip, and Dakhil 1996). With endogenous uncertainty being potentially reducible through efforts, the delaying effects normally associated with real options theory are not as relevant as with exogenous uncertainty. This research builds on the conceptualization of van de Vrande, Vanhaverbeke, and Duysters (2009) and specifically focuses on *exogenous uncertainty* – the uncertainty that exists outside the firm's control and resolves over time (rarely affected by firms' actions).

Market uncertainty does not in itself cause market failure (Amit, Brander, and Zott 1998) however, it does affect investment strategies. Research suggests that uncertainty should influence the likelihood of investment when investments are at least partially irreversible, and the investor has discretion over the timing

of the investment (Campa 1993; Dixit 1992). Since the resolution of exogenous uncertainty may lead to either favorable or unfavorable organizational outcomes, it would appear worthwhile for entrepreneurs to maintain strategic flexibility. In this situation, delay can be more valuable, and less risky, than an immediate investment as it provides the flexibility to defer the investment decision until additional information is revealed (Dixit and Pindyck 1994; McDonald and Siegel 1986).

Accordingly, the presence of exogenous uncertainty may alert entrepreneurs to be more cautious in launching competitive actions, and to search for and compare alternative ways to compete (Miller and Chen 1996). This implies that exogenous uncertainty slows firms' speed of competitive moves as well as the intensity of competitive attacks. Therefore, we propose:

Hypothesis 1a: The speed of action of a firm is likely to be inversely associated with the level of exogenous environmental uncertainty.

Hypothesis 1b: The intensity of action of a firm is likely to be inversely associated with the level of exogenous environmental uncertainty.

3.2 FMA and Entrepreneurial Competitive Action

The timing of market entry, involving the tradeoff between timely commitment and strategic flexibility, is a central concern of strategists (Ghemawat 1991) as entry involves loss of flexibility and exposure to uncertainty (Miller and Folta 2002). Research on real options theory has aided our understanding of the entry timing decision by clarifying the value of waiting (McDonald and Siegel 1986; Trigeorgis 1991). Utilizing a deferral option may be beneficial because it preserves the flexibility to invest when favorable conditions develop, or to back off when conditions worsen. A decision to launch a new product/service or venture normally involves significant financial investment, typically requiring a full-scale commitment of all agents and is largely irreversible. However, wait-and-see strategies also increase opportunity costs with the loss of potential FMA.

Theorists of FMAs argue that the first firm in an industry can obtain a competitive advantage over other firms (Lieberman and Montgomery 1988). Early entry may better position the firm to build capabilities, enable technological advantage, build brand recognition, acquire resources that may lower cost, or take advantage of growth opportunities (Kulatilaka and Perotti 1998; Lieberman and Montgomery 1998) while being late can carry penalties in terms of reduced market share and profitability, especially when product life expectancy is relatively short (Rudolph 1989).

Being first to market does not guarantee advantage; it does however provide opportunity to set standards (Zane, Yamada, and Kurokawa 2014). While some pioneers such as RCA (color television) and Gillette (razors) have succeeded over long period of time, other such as Royal Crown (diet soda), Chux (disposable diapers), and Ampex (video recorders) ceded market leadership to followers (Tellis and Golder 1996). According to Tellis and Golder (1996) pioneers (first to market) had a failure rate of 47 % and controlled 10 % of their respective markets while early followers had minimal failure rates and controlled three times the market share. While market share initially went to first movers, long-term success was attributed to vision, managerial persistence, financial commitment, relentless innovation, and leveraging of assets; not merely market entry timing.

When deciding whether to defer, the evaluation must analyze the cost and benefit of the deferral (Kester 1984). This includes the level of risk and uncertainty, the capabilities and resources of the competition, and of course the size of the potential market. Finally, the entrepreneur must ask if she has the resources and capabilities to capture the benefits of the opportunity. The advantages of entering the market quickly can be viewed in terms of the strategic impact on the cost and profitability of the enterprise (Rothwell 1994) and when determining the cost of being first to market, an enterprise compares the cost of accelerating product development in order to enter the market faster against the possible penalties accompanying lateness. If delayed entry to the market will have little impact on firm performance (in the market), the company has fewer reasons to incur the extra cost of speeding up the innovation process (Borg 2001). Otherwise, delay is thought to be costly.

Based on the above arguments, we propose that as the opportunity for FMA increases, the perceived value of quick entry increases, and thus the propensity to use deferral options decreases.

Hypothesis 2a: The speed of action of a firm is likely to be positively associated with the level of FMA.

Hypothesis 2b: The intensity of action of a firm is likely to be positively associated with the level of FMA.

3.3 Cognitive Biases: The Moderating Effect of Risk Propensity

Upper echelon theory (Hambrick and Mason 1984) rests on the premise that the psychological traits of the management team have significant influence on the strategic direction of companies. Empirical research in this area has generally found support for this relationship (Carpenter, Geletkanycz, and Sanders 2004;

Payne et al. 2005). Similarly, in the entrepreneurship literature, there is a stream of literature suggesting that the cognitive biases of entrepreneurs are distinctive and subsequently affect their decisions to start new ventures or generally behave in an entrepreneurial manner (Busenitz and Barney 1997; Simon, Houghton, and Aquino 2000).

Cognitive biases and heuristics can be effective and efficient guides 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 quick and effective methods for approximating the proper decision (Busenitz and Barney 1997; Tversky and Kahneman 1974).

Research into human cognition has produced some conclusions of interest: 1) judgmental heuristics are not independent of context or content (Kahneman and 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.

Entrepreneurs have been shown to have elevated levels of cognitive biases such as illusion of control (Simon, Houghton, and Aquino 2000) and risk propensity (Stewart Jr. and Roth, 2001 2004). These characteristics may explain why entrepreneurs have a higher tolerance for ambiguity (Teoh and Foo 1997), interpret risk differently (Busenitz 1999; Janney and Dess 2006), and make decisions like “rugged” individuals (Busenitz and Barney 1997). In addition, these characteristics likely play a significant role in entrepreneurial cognition and real-options preferences with respect to competitive moves impacted by exogenous uncertainty and FMAs. For example, the illusion of control should be directly related to the perceived control over events taking place under conditions of exogenous uncertainty, while a higher risk propensity should make a broader spectrum of first-mover opportunities acceptable to key decision-makers. As such, we have focused on the illusion of control and risk propensity in this study.

Risk propensity is defined as an individual’s tendency to take or avoid risks and it can influence the way individuals frame decisions under conditions of uncertainty (Kahneman and Tversky 1979). Risk propensity reflects the natural disposition of individuals and is revealed in their business decisions and other behaviors. For example, the risk propensity of executives has been linked with firms’ strategic risk-taking (Devers et al. 2008). In the entrepreneurship literature, risk propensity is correlated with entrepreneurial intentions (Zhao, Seibert, and Lumpkin 2010) and with a tolerance for ambiguity (Lauriola and Levin 2001) which may be key for those evaluating a new opportunity. Not all entrepreneurs

have high levels of risk propensity, but according to Bromiley and Curley (1992), risky decisions are affected by individual predispositions toward risk. Krueger and Dickson (1994) suggest that perceptions of self-efficacy significantly influence risk-taking through perceptions of opportunities and threats. That is, those with high perceived self-efficacy were apt to take more risks because they subjectively give less weight to the chance of realizing a loss and more weight to the possibility of gains. The result of overweighing uncertain gains against uncertain losses motivates these individuals to make riskier choices than their risk-averse counterparts.

Risk propensity, on its own, does not explain why entrepreneurs are willing to undertake a business venture. However, based on the above literature it is hypothesized that those with higher levels of risk propensity will see less risk, be less cautious, and therefore be willing to make competitive moves more quickly and frequently than those with lower levels of risk propensity. Hence we propose that individuals with higher levels of risk propensity will make quicker and more intense strategic moves under conditions of both environmental uncertainty and FMA.

Hypothesis 3a: An entrepreneur's risk propensity moderates the relationship between exogenous environmental uncertainty and the speed of action of the firm such that as the level of risk propensity increases, the relationship between exogenous environmental uncertainty and the speed of action of the firm weakens.

Hypothesis 3b: An entrepreneur's risk propensity moderates the relationship between exogenous environmental uncertainty and the intensity of action of the firm such that as the level of risk propensity increases, the relationship between exogenous environmental uncertainty and the intensity of action of the firm weakens.

Hypothesis 3c: An entrepreneur's risk propensity moderates the relationship between potential FMA and the speed of action of the firm such that as the level of risk propensity increases, the relationship between potential FMA and the speed of action of the firm strengthens.

Hypothesis 3d: An entrepreneur's risk propensity moderates the relationship between potential FMA and the intensity of action of the firm such that as the level of risk propensity increases, the relationship between potential FMA and the intensity of action of the firm strengthens.

3.4 Cognitive Biases: The Moderating Effect of Illusion of Control

Illusion of control is an individual's overestimation of the extent to which they can affect the outcome of particular situations (Duhaime and Schwenk

1985) and positively affects peoples' assessments of their chance of success at a venture. Illusion of control is a cognitive bias or heuristic that is an inaccurate estimation of the facts of a particular situation and one's ability to cope with and predict future events (Simon, Houghton, and Aquino 2000). Langer (1975) found that entrepreneurs with higher levels of illusion of control expressed an expectancy of personal success much higher than objective probability would predict. This occurs because they over-emphasize 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.

We suggest that as levels of illusion of control increase, entrepreneurs will be quicker to jump into an investment despite high levels of uncertainty. The impression that the entrepreneur has that he will be able to control events as the situation unfolds will tend to reinforce his decision to move quickly. Similarly, we argue that an individual with high illusion of control will tend to intensify the intensity of actions associated with competitive moves.

We further suggest that the moderating effect of illusion of control will also impact the relationship between FMA and both timing and intensity of actions. Specifically, armed with the notion that moving first might bring competitive advantage, those with higher levels of illusion of control will tend to act more quickly and with more frequent actions.

Hypothesis 4a: An entrepreneur's illusion of control moderates the relationship between exogenous environmental uncertainty and the speed of action of the firm such that as the level of illusion of control increases, the relationship between exogenous environmental uncertainty and the speed of action of the firm weakens.

Hypothesis 4b: An entrepreneur's illusion of control moderates the relationship between exogenous environmental uncertainty and the intensity of action of the firm such that as the level of illusion of control increases, the relationship between exogenous environmental uncertainty and the intensity of action of the firm weakens.

Hypothesis 4c: An entrepreneur's illusion of control moderates the relationship between potential FMA and the speed of action of the firm such that as the level of illusion of control increases, the relationship between potential FMA and the speed of action of the firm strengthens.

Hypothesis 4d: An entrepreneur's illusion of control moderates the relationship between potential FMA and the intensity of action of the firm such that as the level of illusion of control increases, the relationship between potential FMA and the intensity of action of the firm strengthens.

4 Methods and Sample

This research examines the direct effect of both exogenous environmental uncertainty and FMA on the speed and intensity of competitive moves taken by ventures. Then, it examines the moderating effect of two cognitive biases, illusion of control and risk propensity, on these relationships. The study employed a two-by-two within-subjects design in which exogenous environmental uncertainty (high vs low) and FMA (high vs low) were manipulated.

In order to objectively test our hypotheses concerning competitive strategies under varying environmental conditions, we sought a sample of professionals who would be knowledgeable of business operations and strategy. We chose to survey lawyers and Certified Public Accountants (CPAs) as many are not only founders or partners in their own businesses, but are often called upon by their clients to discuss, review, and/or recommend actions that are strategic in nature. In this study, 40.4 % of the respondents designated themselves as a partner in their firm while 36 % claimed to be a founding partner.

Cross-sectional survey data were collected at four seminars in the mid-Atlantic region of the United States over a four and one-half month period. Each seminar offered continuing education credits for lawyers and CPAs. Attendees were offered a \$20 gift card to participate. In total, 117 of 139 attendees (84 %) agreed to participate in the study and completed a survey. After removal of three incomplete entries, 114 valid responses remained (82 % of attendee sample). Each participant responded to all four scenarios, for a total of 456 sets of responses.

The demographics of the included sample are as follows. 70.2 % are male; 77.2 % report being married or living with a partner, with 2 not answering. 85.1 % Caucasian, 7.9 % African American, 3.5 % Hispanic, and 1.8 % Asian with one not answering. Years of industry experience ranges from 1 to 59 with a median of 22 years. One respondent did not answer. Age ranges from 31 to 82 with a median of 52. One respondent did not answer. With regard to firm size, 43 % report working for a small firm (1–25 employees), 17.6 % report working for a mid-size firm (26–200 employees), 23.7 % report working for a large firm (greater than 200 employees), with 15.4 % not reporting. For education, 14 % report having a bachelor's degree, 14 % a master's degree, 68.4 % a professional degree, 1 % a doctorate, and 12 did not report. Finally, 67.5 % report being an attorney, 31.6 % report being a CPA, while two report to be an attorney and a CPA and two reported to be neither an attorney nor a CPA.

4.1 Measures

Respondents read the following vignette as background for the scenarios that followed.

You are a senior manager with an established business. Throughout your ten years of industry experience, you have established yourself as a marketable asset within the industry, built a solid network of both past and present associates, and established good ties with upper management. It is likely that the company will continue to grow in the near future and that your career within the organization is likely to advance as well. The company has opportunities ahead of it and the CEO has asked for your recommendations. For each of the following four situations, please read the scenario and answer the questions that follow.

Each of the four scenarios detailed an opportunity for the business; however we systematically varied the wording to affect perceptions of Exogenous Environmental Uncertainty (EEU) and FMA. One scenario detailed high levels of perceived FMA and EEU; one detailed low levels of each, the remaining scenarios alternated high/low levels of the two main effects. Each respondent was exposed to all four scenarios; however the order of the scenarios was randomized to avoid an order effect (Krosnick and Alwin 1987). Each scenario was followed by a set of associated questions that asked respondents to make decisions regarding the frequency and timing of competitive moves. Questions were posed in the following manner, on a scale of 1 to 5, with 1 being Very Un-Likely and 5 being Very Likely, How likely are you to agree with launching the new product as soon as possible?

In an effort to overcome common measurement errors stemming from participant misunderstandings, interpretations, and satisficing (Collins 2003), we pre-tested our scenarios and accompanying question sets with a group of undergraduate business students and with faculty from a college of business. The scenarios and/or questions were modified following each pre-test based on feedback. See Table 1 for the list of questions.

4.1.1 EEU and FMA

Respondents' perceptions of EEU and FMA are critical to this study, and the scenarios were written to manipulate perceptions in this regard. To capture these values, we asked two questions as part of each scenario-questions set. To capture perceptions of FMA we asked, on a scale of 1 to 5, with 1 being Very Un-Likely and 5 being Very Likely, What is the possibility of your business

Table 1: Survey questions^a.

1	How likely are you to agree with launching the new product as soon as possible?
2	How likely are you to agree with quickly investing funds to refurbish existing facilities to enable launching the new product?
3	How likely are you to agree with immediate hiring of additional staff to enable launching the new product?
4	How likely are you to agree with delaying the launch until a competitor tests the market? (Reverse coded)
5	How likely are you to agree with reducing prices to keep or improve market share?
6	How likely are you to agree with investing additional funds to make improvements to the new product to keep or improve market share?
7	How likely are you to agree with utilizing a joint venture with a trusted partner to expand production capacity?
8	How likely are you to pause to observe competitor reaction before taking action? (Reverse coded)
9	What is the possibility of your business capturing significant market share during the next 12 months?
10	How likely is it that, at least in the next 12 months, no immediate changes are forthcoming with regard to items out of your control (e. g. governmental rules or changes in competitors' products or tactics) that could adversely affect the business. (Reverse coded)

Note: ^aResponses were based on a 1–5 scale, with 1 being Very Un-Likely and 5 being Very Likely.

capturing significant market share during the next 12 months? To capture perceptions of EEU we asked, on a scale of 1 to 5, with 1 being Very Un-Likely and 5 being Very Likely, How likely is it that, at least in the next 12 months, no immediate changes are forthcoming with regard to items out of your control (e. g. governmental rules or changes in competitors' products or tactics) that could adversely affect the business. This “stability perception” value should be low if EEU is high and is reversed (6 – value) for the purpose of representing the level of EEU. As a manipulation check, we computed the mean values for FMA and EEU across all respondents for the four scenarios (see Table 2).

Table 2: Perception of first-mover advantage (FMA) and exogenous environmental uncertainty (EEU).

Four scenarios: Green, Orange, Red and Blue	FMA	EEU
Green – Perceived FMA is low, Perceived EEU is low	3.27	3.10
Orange – Perceived FMA is low, Perceived EEU is high	2.93	3.24
Red – Perceived FMA is high, Perceived EEU is high	3.61	3.26
Blue – Perceived FMA is high, Perceived EEU is low	4.12	3.04

The FMA scores are higher for the red and blue scenarios as expected. Also, The EEU scores are higher for the orange and red scenarios, as expected. The FMA score was highest for the blue scenario, which provided both high potential for FMA and low levels of EEU. A check of the mean scores using one way t-tests revealed that the manipulations were successful as the differences were significant at $p < 0.001$ for FMA and $p < 0.05$ for EEU.

4.1.2 Speed of Action and Intensity of Action

A set of eight questions were developed for use in this study. Factor analysis was then used to validate the alignment of answers received from these questions. A scree plot showed a distinct break at two factors (Tabachnick and Fidell 2007) and only two factors had eigenvalues greater than one. For our factor analysis, we used a varimax rotation and received two factors which explained 49.97 % (factor one) and 18.08 % (factor two) of variance. Variables which uniquely loaded on a factor (loading greater than 0.5) and which showed minimal cross loadings on other factors (loading less than 0.3) are shown in Table 3 and were retained and used to construct the final factors.

Table 3: Exploratory factor analysis – varimax rotation.

Question	Abbreviated wording of question	Factor 1	Factor 2
1	Launch new product as soon as possible	0.883	
2	Quickly investing funds to refurbish existing facilities	0.858	0.212
3	Immediate hiring of additional staff	0.857	0.261
4	Delaying launch until a competitor tests the market	0.762	
5	Reduce prices		0.785
6	Investing additional funds to make improvements to the new product	0.644	0.499
7	Utilizing a joint venture to expand production capacity		0.748
8	Pause to observe competitor reaction	0.748	

Note: Item 6 cross-loaded at more than a 0.3 level and was subsequently dropped from the analysis. Items loading at less than 0.2 were eliminated for clarity.

Factor one, entitled speed of actions, contains five questions (questions 1, 2, 3, 4, and 8). Questions 1 through 3 relate directly to speed while questions 4 and 8 speak to delays related to the competition and were thus reverse coded. Factor two, entitled intensity of action, contains two questions (questions 5 and 7), both

of which relate to frequency of action. Questions 6 cross loaded and was dropped. Cronbach alpha for these two factors were 0.886 and 0.504 respectively. Mean values were then computed for these sets of questions and utilized as dependent variables.

4.1.3 Risk Propensity

The measurement of Risk Propensity was based on a four item scale taken directly from Gomez-Mejia and 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. We used the mean value of the four items.

4.1.4 Illusion of Control

Our measure of Illusion of control was adapted from Simon, Houghton, and Aquino (2000) and includes items such as “I can succeed in situations, even though many others would fail” and “My skills will be the most important determinant of success in my career.” Respondents rated the extent to which they agree with each of four statements; scale of 1, strongly disagree to 5, strongly agree. We used the mean value of the four items.

4.1.5 Controls

Previous studies have shown that certain personal demographic characteristics such as gender (Tornikoski and Newbert 2007) and age (Reynolds et al. 2004) may be related to firm creation and opportunity pursuit. We decided to include years of industry experience (rather than the highly correlated age), partner status, and log of the number of employees in the firm to account for factors that may affect strategic decision making. While years of education is thought to be important as developmental psychologists have supported the connection between education level and improved knowledge structures and information processing (Smith, Collins, and Clark 2005), a correlation matrix showed no high correlations between education and any of the independent, dependent or moderating variables, so it was excluded from the models. In similar fashion, dummy variables for attorney and CPA were not highly correlated with the variables of interest so they too were excluded.

5 Results

SPSS version 22 was used to test the hypotheses via linear regression, build the correlation table, and run checks for normality and multicollinearity.

As a test for normality, QQ plots and PP plots were run for the independent variables (FFA and EEU), the dependent variables (Factor 1 – Speed and Factor 2 – Intensity), and the moderating variables (risk propensity and illusion of control). No problems with normality were identified. Additionally, the variables of interest were checked for signs of multicollinearity. The Variable Inflation Factor for each item was under 2, indicating no presence of multicollinearity.

Table 4 shows the means, standard deviations, and correlations for the study variables. The correlation table shows several prominent relationships. As expected, EEU and FMA are negatively correlated at a significant level. Both Factor 1 (Speed) and Factor 2 (Intensity) are negatively correlated to EEU, but only Factor 1 reaches significance. Both factors are positively correlated with FMA at a significant level. Risk propensity and illusion of control show no significant correlations to the independent or dependent variables, but are significantly correlated with each other and gender. Years of experience is significantly correlated with gender, and with risk propensity but not illusion of control. Finally, partner status is significantly correlated to Factor 1 (Speed) and both cognitive biases.

Hypotheses 1a and 1b state that EEU should be correlated with lower levels of speed of action and intensity of action respectfully. The regression results (see Table 5 – Models 2 and 4) show that EEU was negatively significantly related with speed of action ($p = 0.013$) but not with intensity of action ($p = \text{NS}$). Thus, H1a is supported while H1b is not supported.

Hypotheses 2a and 2b state that FMA should be correlated with higher levels of speed of action and intensity of action respectfully. The regression results (see Table 5 – Models 6 and 8) show that FMA was positively significantly related with speed of action ($p = 0.000$) but not with intensity of action ($p = \text{NS}$). Thus, H2a is supported while H2b is not supported.

H3a and H3b state that as risk propensity rises, the negative effect of EEU on speed and intensity decreases. For H3a, risk propensity, EEU and FMA² were entered in the second step (see Table 6 – Model 9), and the interaction term (risk propensity * EEU) was entered in the third step (Model 10). The interaction term was significant at $p = 0.029$, thus providing support for H3a. For H3b, risk propensity, EEU and FMA were entered in the second step (Model 11), and the

² Note – FMA was entered as a second step control for H3a, H3b, H4a and H4b. These regressions were run both with and without FMA as a control and achieved similar results.

Table 4: Means, standard deviations, correlations.

Variable	Mean	s.d.	1	2	3	4	5	6	7	8	9
1. Ex.Env.Unc.	3.16	1.135									
2. First Mover	3.49	1.099	-0.213**								
3. F1 Speed	3.51	0.955	-0.113*	0.717***							
4. F2 Intensity	3.19	0.877	-0.056	0.135**	0.130**						
5. Risk Propensity	3.54	0.776	0.023	0.040	0.078±	-0.059					
6. Illusion Control	3.60	0.560	-0.087±	0.011	0.091±	-0.056	0.281**				
7. Gender 1=female	0.30	0.458	-0.002	0.055	0.047	0.055	-0.258**	-0.098*			
8. Yrs FT Exp.	26.81	11.451	-0.098*	-0.027	-0.044	-0.006	0.233**	0.074	-0.291**		
9. Num Of Emp	5.58	0.743	0.109*	0.037	0.081	-0.062	0.002	0.002	0.025	0.000	
10. Partner 1=no	0.53	0.500	0.058	0.077	0.100*	-0.028	-0.199**	-0.119*	0.195**	-0.325**	0.730***

Note: ± $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 5: Regression results of EEU and FMA on speed and intensity (direct effects).

DV Hypothesis	Model 1 controls speed	Model 2 EEU speed H1a	Model 3 controls intensity	Model 4 EEU intensity H1b	Model 5 Controls speed	Model 6 FMA speed H2a	Model 7 controls intensity	Model 8 FMA intensity H2b
Gender 1=female	0.066	0.063	0.137	0.136	0.068	-0.002	0.138*	0.133*
Years FT Exp	0.050	0.033	0.042	0.039	0.051	-0.003	0.042	0.038
Num Of Emp	0.018	0.039	-0.086	-0.083	0.019	0.047	-0.083	-0.081
Partner	0.096	0.083	0.020	0.018	0.099	0.015	0.023	0.017
EEU		-0.129*		-0.016				
FMA						0.712***		0.049
Sig F Change	0.190	0.013	0.083	0.758	0.166	0.000	0.084	0.339
R ²	0.016	0.032	0.022	0.022	0.017	0.515	0.022	0.024
Adj R ²	0.006	0.019	0.011	0.009	0.007	0.508	0.011	0.011
Chg in R ²	0.016	0.016	0.022	0.000	0.017	0.498	0.022	0.002
N	376	376	378	378	377	377	379	379

Note: ± $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 6: Regression results of EEU and FMA on speed and intensity (moderating effects of risk propensity).

Model	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
DV	controls	EEU*Risk	controls	EEU*risk	controls	FMA*risk	controls	FMA*risk
hypothesis	speed	speed	intensity	intensity	speed	speed	intensity	intensity
First step – Controls		H3a		H3b		H3c		H3d
Gender	0.012	0.015	0.115*	0.111*	0.012	0.012	0.115*	0.117*
1=female								
Years FT Exp	-0.012	-0.008	0.050	0.045	-0.012	-0.011	0.050	0.046
Num Of Emp	0.046	0.047	-0.086	-0.090	0.046	0.046	-0.086	-0.080
Partner	0.020	0.021	0.011	0.012	0.020	0.019	0.011	0.010
EEU	0.011	0.386*	-0.004	-0.529*	0.011	0.012	-0.004	-0.013
FMA	0.711***	0.705***	0.046	0.054	0.711***	0.681***	0.046	0.448±
Risk	0.055	-0.131	-0.065	0.199	0.055	0.034	-0.065	0.216
Propensity								
Illusion								
Control								
Third step – Interaction								
EEU*Risk		0.425*		-0.596*		0.037		-0.502
FMA*Risk								
EEU*Illusion								
FMA*Illusion								
Sig F Change	0.000	0.029	0.560	0.029	0.000	0.867	0.580	0.105
R²	0.515	0.522	0.027	0.040	0.515	0.515	0.027	0.034
Adj R²	0.506	0.511	0.009	0.019	0.506	0.505	0.009	0.013
Chg in R²	0.499	0.006	0.005	0.012	0.499	0.000	0.005	0.007
N	376	376	378	378	376	376	378	378

Note: ± $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 7: Regression results of EEU and FMA on speed and intensity (moderating effects of illusion of control).

	Model 17	Model 18	Model 19	Model 20	Model 21	Model 22	Model 23	Model 24
Model moderator	controls	EEU*illusion speed H4a	controls intensity	EEU*illusion intensity H4b	controls speed	FMA*illusion speed H4c	controls intensity	FMA*illusion intensity H4d
DV Hypothesis								
First step –								
Controls								
Gender 1=female	0.015	0.017	0.127*	0.123*	0.015	0.011	0.127*	0.121*
Years FT exp	–0.007	–0.010	0.039	0.045	–0.007	–0.005	0.039	0.040
Num of emp	0.061	0.065	–0.087	–0.092	0.061	0.056	–0.087	–0.095
Partner	0.013	0.005	0.015	0.026	0.013	0.025	0.015	0.033
Second step								
EEU	0.020	0.431 ±	–0.010	–0.623 ±	0.020	0.020	–0.010	–0.009
FMA	0.712***	0.714***	0.042	0.040	0.712***	1.078 ***	0.042	0.585 ±
Risk propensity								
Illusion control	0.112**	–0.038	–0.032	0.191	0.112**	0.296*	–0.032	0.240
Third step –								
Interaction								
EEU*Risk								
FMA*Risk								
EEU*illusion		0.453 ±		–0.676 ±		–0.415		–0.614
FMA*illusion						0.119		0.107
Sig F Change	0.000	0.083	0.781	0.071	0.000		0.781	
R ²	0.525	0.529	0.025	0.033	0.525	0.528	0.025	0.032
Adj R ²	0.516	0.518	0.006	0.012	0.516	0.518	0.006	0.011
Chg in R ²	0.508	0.004	0.003	0.009	0.508	0.003	0.003	0.007
N	376	376	378	378	376	376	378	378

Note: ± $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

interaction term (risk propensity * EEU) was entered in the third step (Model 12). The interaction term was significant at $p = 0.029$ but negative when we expected it to be positive, thus providing no support for H3b.

H3c and H3d state that as risk propensity rises, the positive effect of FMA on speed and intensity respectfully increases. For H3c, risk propensity, EEU³ and FMA were entered in the second step (Model 13), and the interaction term (risk propensity * FMA) was entered in the third step (Model 14). The interaction term was not significant, thus providing no support for H3c. For H3d, risk propensity, EEU and FMA were entered in the second step (Model 15), and the interaction term (risk propensity * FMA) was entered in the third step (Model 16). The interaction term was not significant, thus H3d was not supported.

H4a and H4b state that as illusion of control rises, the negative effect of EEU on speed and intensity respectfully decreases. For H4a, illusion of control, EEU and FMA were entered in the second step (see Table 7 - Model 17), and the interaction term (illusion of control * EEU) was entered in the third step (Model 18). The interaction term approached significant at $p = 0.083$, thus providing some support for H4a. For H4b, illusion of control, EEU and FMA were entered in the second step (Model 19), and the interaction term (illusion of control * EEU) was entered in the third step (Model 20). The interaction term approached significance at $p = 0.079$, but was negative when we expected it to be positive, thus providing no support for H4b.

H4c and H4d state that as illusion of control rises, the positive effect of FMA on speed and intensity increases. For H4c, illusion of control, EEU and FMA were entered in the second step (Model 21), and the interaction term (illusion of control * FMA) was entered in the third step (Model 22). The interaction term was not significant at $p = 0.119$ thus providing no support for H4c. For H4d, illusion of control, EEU and FMA were entered in the second step (model 23), and the interaction term (illusion of control * FMA) was entered in the third step (model 24). The interaction term was not significant at $p = 0.107$, thus providing no support for H4d.

6 Conclusions

With regard to direct effects, the results of this study suggest that perceptions of both FMA and EEU have a direct effect on speed of action, but not on intensity of

³ Note – EEU was entered as a second step control for H3c, H3d, H4c, and H4d. These regressions were run both with and without EEU as a control and achieved similar results.

action. We believe that this is potentially due to the sample selected for this study. As noted previously, our respondents were drawn from the accounting and legal fields, which have a service orientation. While service firms have an incentive to be first to market with new services, so that they develop a reputation for being thought leaders in the industry, the number of competitive moves may be counter-productive. Due to the nature of the industry, the speed of an offering is potentially easier to undertake, and more valuable than the number of competitive moves. Intellectual capital is flexible so service firms can rely on project teams to quickly learn new skills when new projects surface, as opposed to the lead times that accompanies the high fixed costs of capital-intensive businesses. As such, it is not surprising to see these respondents favoring quick entry. Likewise it is plausible to see insignificant results with respect to the intensity of action. Another possibility is that this result is partially the result of the size of the firms in our population as 43 % of our respondents were from small firms (1–25 employees) with an additional 17.6 % from mid-size (26–200) firms. Small accounting and legal firms generally have a local approach with respect to competitive moves while large firms may require a series of integrated competitive moves to compete with larger regional and national rivals.

When looking at the interaction effect of risk propensity, the effects appear to be inconsistent. It significantly influenced the EEU to speed of action relationship but was negative in the EEU to intensity of action relationship. Meanwhile, it did not reach significance with the FMA to speed of action or intensity of action relationships.

When examining the interaction effects of illusion of control, the effects were more pronounced than that of risk propensity. First, as a control in step two, it was significantly positively correlated with speed (Models 17 and 19) but not intensity (Models 19 and 23). As an interaction term, illusion of control x EEU positively influenced the EEU to speed of action relationship, but was negative with regard to intensity. The interaction term, illusion of control x FMA, was not significantly related to either speed or intensity.

There is a clear indication that perceptions of both EEU and FMA have a direct effect on speed of actions. Risk propensity appears to interact with EEU with regard to speed, but not with FMA. Illusion of control may in fact have a direct effect on speed (though we were not looking for this relationship). Resembling risk propensity, illusion of control appears to somewhat moderate the EEU to speed in a positive manner while turning negative with regard to intensity.

Business owners often need to decide the timing and frequency to launch competitive moves under some level of uncertainty. Although both speed and intensity of competitive actions are associated with high payoffs for firms

competing in markets, starting, or taking the next step involves a significant commitment of time and resources, and is largely irreversible. While some of the knowledge and experience gained, as well as portions of the development work may be salvageable, inappropriate timing and intensity of action often results in significant loss. Because uncertainty transpires largely independent of any one organization's activities, rational logic would dictate that the firm may be better off waiting for new information before committing to the next move (Aldrich 1999).

We suggested that the benefit of a delayed action (due to uncertainty) is reasonably offset by the opportunity to gain a FMA. We further proposed that individual factors of the entrepreneur, in this case risk propensity and the illusion of control, 1) work to lessen the influence of uncertainty on decisions to act, and 2) amplify the effect of FMA. Findings from this study support many of our assertions. Specifically, individuals with a high propensity toward risk as well as those high in illusion of control made quicker but less intense strategic moves under conditions of exogenous environmental uncertainty.

6.1 Limitations and Future Research

We note that a few limitations warrant further discussion and, if addressed in future research, would further the literature on real options, cognitive biases, and entrepreneurial decision-making. First, the results may not be generalizable since the respondents are drawn primarily from the legal and accounting fields. As such, it is possible that their responses are not representative of responses offered by those in other industries like technology, pharmaceuticals, or manufacturing. Since there are different risk and return profiles for potential projects in different industries, it may lead to significant variation in perspectives and thus may influence investment decision-making.

Second, our study is subject to typical issues in experimental studies on entrepreneurial decision-making, specifically, gathering a large enough sample of professional participants (non-students). A number of tangential studies have examined entrepreneurial cognition with sample sizes that approximate our sample. In a study of how entrepreneurs and managers perceive risk, Mullins, Forlani, and Cardozo (2002) examined a sample of 55 respondents (33 entrepreneurs and 22 managers) and found that individual differences, not group differences, significantly influenced risk perception. Forlani and Mullins (2000) studied a sample of 78 entrepreneurs and found that entrepreneurs avoid ventures with a high degree of variability, while Busenitz and Barney (1997)

examined a sample of 124 entrepreneurs, finding that they have a tendency to rely on heuristics to make decisions. Finally, in a study of overconfidence, Forbes (2005) studied entrepreneurs from 108 firms and found that biases result from both individual and contextual characteristics. Collectively, these studies provide support for the sample size of this study. However, our sample size does limit the generalizability of our findings.

The focus on the accounting and legal fields, as well as the sample size of 114 respondents may potentially explain the non-findings, and negative findings, related to intensity of action. Alternatively, we could also question whether the survey failed to adequately capture this construct, or perhaps intensity of action is simply not affected in the same manner as speed of action. However, this is a question that can only be answered by future studies.

Third, our study relied on cross-sectional data. Our data was collected during a four and a half month period during the fall of 2014. Macroeconomic or industry conditions during that period may have influenced the risk and return expectations of our respondents. Future research capturing data from the same respondents during multiple observation periods would help to alleviate this concern.

Finally, according to Fourati and Affes (2014), the source of the firm's venture funding, founders' money versus outside investors, together with perceived type of risk (viewed as opportunity or threat) influenced attitudes toward risk and ultimately decisions regarding pursuit of opportunities. While source of funding most likely did not play a role in the focal research as the sample was made up of law and CPA firms as opposed to individual founders, perceptions of risk type may have influenced attitudes. Perhaps future research could examine the joint effect of funding source and perceptions of risk type along with environmental conditions (FMA and exogenous environmental uncertainty) and/or cognitive biases to examine the joint effect on pursuit of opportunities.

6.2 Contributions

This research contributes to real options theory, by examining the boundary conditions and contingencies that may influence the decision by entrepreneurs to launch competitive moves. In addition, we contribute to entrepreneurship and strategic theory by examining the joint relationship between industry and individual factors that affect entrepreneurial decisions and thus actions. In particular, we discuss when entrepreneurs launch competitive moves, particularly the speed of action and intensity of action, under conditions with exogenous

uncertainty and FMA. We argue that the way entrepreneurs conduct competitive activities are contingent on their cognitive biases. Finally, we contribute to entrepreneurial practice, by explaining to potential entrepreneurs, the effect these factors have on the strategies they choose.

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