

Opportunity Discovery under Risky Conditions

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Abstract

The purpose of this paper is to develop an understanding of entrepreneurs decision-making when they are faced with risky conditions at the time of opportunity discovery. Thus, in an experimental study, we compared two groups of entrepreneurs and non-entrepreneurs according to their manners of decision-making. The study draws on an internet-based survey sent in December 2013 to 120 adults (60 entrepreneurs and 60 non-entrepreneurs). Entrepreneurs were from different small businesses in three different industries. Participants were randomly assigned to three different non-entrepreneurial tasks of life and death, investment and time plus one entrepreneurial opportunity task. All the tasks were designed based on risky choice framing in negative vs. positive conditions. Results show that entrepreneurs are impervious to framing effects in opportunity scenario and show very little inconsistency in risk seeking behavior in both negative and positive conditions.

Key Words: *Cognitive biases, Entrepreneurial Opportunity, Framing Effects, Judgment and decision-making.*

Introduction

Architects believe that the shape and frame of a window plays an important role in providing a view to the surroundings of a building and the building elements could be displayed in different shapes and sizes by making changes to its structure. The method in which decision-making elements are shaped within mental models may present a problem in different views. Although, these views all have similar consequences, they could result in various and occasionally contradictory options. This phenomenon is called *framing effects* in psychological-judgmental terms (Tversky and Kahneman, 1981; Schoemaker and Russo, 2001). Under uncertainty and environmental complexity and risky conditions, deciding for a new venture is impossible through formal data analysis and any decision-making in this state would lack comprehensiveness and cognition (Blume and Covin 2009). Here, cognitive heuristics and intuitions are used as an effective and efficient guide in an entrepreneur's decision-making process (Pitz and Sachs, 1984). Therefore, cognitive deviations and revelation could provide a suitable way to make a good decision (Tversky and Kahneman, 1974). Various studies have investigated the higher application of revelation and deviation in entrepreneurs compared to non-entrepreneurs in the decision-making process toward cognitive deviations (Busenitz and Barney, 1997). Decision-making is a type of behavior, on the one hand. Although, having an especial ability in facing a phenomenon such as framing effects under complex and uncertain conditions could be praiseworthy, on the other hand. If entrepreneurs act differently based on this type of cognitive ability compared to non-entrepreneurs, they may be considered to have this personality behavior quality. As the present paper authors' research indicates, the contradictive role of framing effects on decision consequences and their effects on entrepreneurs' decision-making and judgments have been scarcely investigated, especially with an objective view to opportunity. Therefore, this paper aims to

investigate how entrepreneurs cope with issues of framing in the field of opportunity under risky and uncertainty conditions.

This research could provide two main theoretical contributions: (1) an explanation of entrepreneurs' decision-making process under risky and uncertain conditions; (2) a response to concerns of entrepreneurial opportunity research that called for considering framing effects and the prospect theory related to the opportunity phenomenon (e.g. MC Mullen and Shepherd, 2006; Shepherd et al, 2007). First, a literature review will be provided on entrepreneurial opportunity and framing, following a research background. Section three consists of research methodology and research results arising from decision scenarios form section four. Finally, a discussion and conclusion will be provided.

Literature Review

Entrepreneurial opportunity

One of the critical aspects of entrepreneurship is opportunity (Shane and Venkataraman, 2000). Eckhardt and Shane, (2003) define entrepreneurial opportunities as "situations in which new goods, services, raw materials, markets and organizing methods can be introduced through the formation of new means, ends or ends-means relationships". An investigation of opportunity revolves around the information individuals possess and how they process it. Shane and Venkataraman (2000) discuss "the possession of prior information necessary to identify an opportunity and the cognitive properties necessary to value it" as two important reasons why some individuals are able to discover opportunities while others are not. In their typology of entrepreneurial opportunities based on supply and demand of market, Sarasvathy et al (2003) describe opportunity discovery as the existence of one side i.e. the supply exists, the demand does not, and vice-versa. Then, the non-existent side needs to be discovered before the competitive game in the market could begin. This notion of opportunity has to do with the exploration of existing and latent markets such as the existence of technological knowhow by an entrepreneur and searching for its demand (Sarasvathy et al, 2003).

Prospect theory (PT)

Many findings have confirmed that we tend to ignore the normative theory of expected utility under risky and uncertain conditions. Here, cognitive deviations are considered as the most important factors. One of the most challenging contradictions is the Allais's paradox in the decision-making processes. Allais (1953) provided a hypothetical decision-making scenario. He argued that when a decision-making option (a cash and probability of winning it) is suggested in two different forms – tabulated and explanatory – people will have contradictory selections. If item 1 is selected within the tabulated form and its equivalent makes 3 within the explanatory form, most of participants might not choose item 3. Therefore, the problem manipulation and its framing have resulted in contradictory/different selections that are in contrast to the normative theory of expected utility. This contradictory concentration resulted from the subjective probability and value and explanatory theories like the prospect theory (Baron, 2008).

According to Tversky and Kahneman, in order to reduce the differences between some biased behaviors and the normative theory of expected utility, another approach is needed for developing new theories and offering justified reasons for these findings. Thus, theory is almost applicable for all data available under risky and uncertain conditions for decision-making. This is significant in that PT is normative rather than explanatory. This accurately clarifies our selection deviations from the theory of expected utility (Baron, 2008).

PT was basically initiated by the principle that we do not consider probabilities in a way that they are provided; we rather distort them. Because we import our subjective values to our judgments when

calculating a probable expected consequence (Tversy and Kahneman, 1981). For instance, Kahneman proposed the wager problem in which a certain number of people prefer definite receiving of 30\$ to receiving 45\$ with 80% of probability (although based on the theory of expected utility the latter can be more valuable). On the other hand, they preferred 45\$ with 20% probability of winning to 30\$ with 25%. They believed that another 15\$ can be obtained with 5% more risk. This preference, definite 30\$ to probable 45\$, is called certainty effect within PT since people have been attracted by absolute certainty of 30\$. Certainty is intrinsically attractive. The certainty effect exits within the loss field. People become risk-takers to stop definite losses. This is similar to avoiding the risk of definite benefit. Another issue that the utility theory was unable to explain is the inalterability principle that PT justified in a proper manner. This principle suggests that an individual's selection should be based on its position rather than the way it has been described. When we could describe the same positions in two similar manners, then we are likely to have similar selections. At times, this principle is overlooked which is known as the framing effects. This is because the selection is based on how the problem is framed rather than the available information itself (Tversy and Kahneman, 1981).

Framing Effects

The prospect theory created a well-known type of framing which affects decisions and is called the risky frame. The reason behind this is that it measures people's judgments when comparing definite and risky events (Tversy and Kahneman, 1981). This type of framing has been frequently employed in many researches (ref. Huang and Wang, 2010; Druckman, 2001). Within this type of framing, most people would likely select definite events when the problem framing is positive (e.g. surviving death, earning interest) and they would likely select risky events (e.g. death, loss of wealth) when the problem framing is negative (Tversy and Kahneman, 1981; Milch, 2009; Druckman, 2001). The more the inclination is toward these two conditions, the stronger the effect of the framing. Meanwhile, the events are of similar consequences both under positive and negative condition (fig. 2). Therefore, subjects provide different judgments based on consequences whether offered in the form of win or lose. One could generally claim that PT forecasts two deviations from the expected utility theory. The first type involves a deviation from probability and how to offer it. That is subject is not involved normatively in probability. The second type involves a deviation in the value equation (utility). In this type of deviation, there is nothing wrong until people begin to compare the provided information within a frame to a reference point. This is when the framing effects take shape. Therefore, PT is the explanatory theory of decision-making under uncertain conditions. As previously mentioned, PT attempts to modify the expected utility theory (Weber and Camerer, 1987).

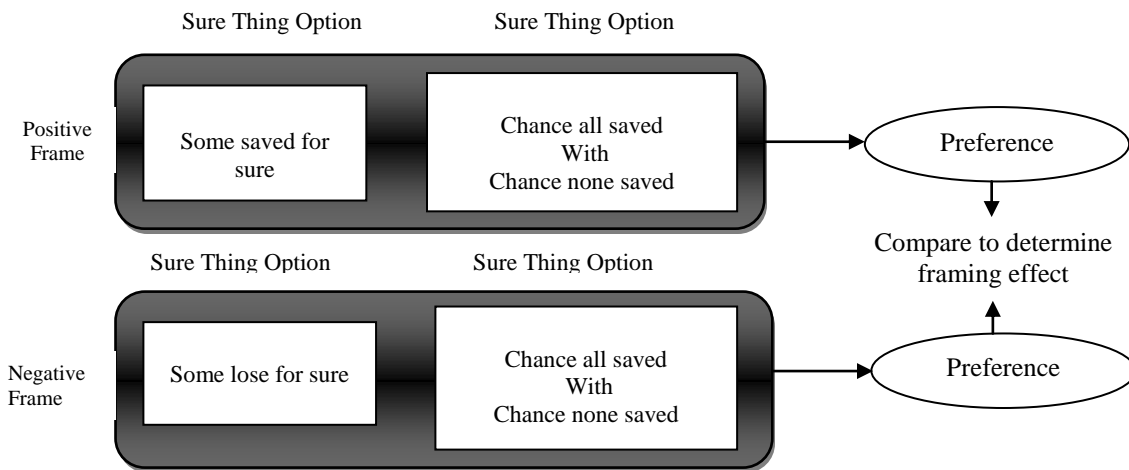


FIG. 1. The standard risky choice framing paradigm. Reference: Levin (1998)

Research Background

Heuristic and cognitive deviations have been studied by many researchers to explain risky behavior and entrepreneurial risk-taking (e.g. Busenitz, 1999; Busenitz and Barney, 1997; Forbes, 2005). In addition to the significance of heuristic cognition, researches in the field of psychological decision-making have been used to clarify the significance and effects of events framing on the risky behavior of managers and entrepreneurs. Barbosa and Fayolle (2008) investigated how changes to available information related to a venture investment creation could affect the risk perception of entrepreneurs about framing problems thus encouraging them to embark on a venture investment. They investigated two cognitive deviations of availability and anchoring biases within entrepreneur's risky decisions and concluded that anchoring biases would overweight business success in conjunctive events and thereby lead to wrong decisions. However, in disjunctive events, it caused entrepreneurs to down-weight the risk of failing. Therefore, cognitive heuristic and framing issues are dependent on each other and the framing of an event could persuade people toward anchoring biases and affect risk perception of entrepreneurs.

Burmeister and Schade (2007) compared the effect of cognitive deviation of status quo biases on entrepreneurs, students, and bankers. They found that entrepreneurs were liable to this cognitive deviation in a level similar to students but less than bankers. They introduced entrepreneurial experience as a reason for the similar level of deviation between entrepreneurs and students that limited innovation in decision-making. On the one hand, experience and entrepreneurial knowledge help them make less biased decisions; and keep them loyal to previous solutions on the other hand. Their findings have not highlighted biased behavior for most decisions of entrepreneurs for the status quo. Forbes (2005) indicated that entrepreneurs apply heuristic and cognitive biases to cope with certain environmental situations related to venture investment. He argued that some entrepreneurs are highly inclined toward certain biases compared to others applying overconfidence bias planning with different levels.

The results showed that age, inclusiveness of decisions and firm's external assets are directly related to the overconfidence bias. Moreover, those managers who are firm founders are highly subject to this bias compared to those who are not. Moreover, overconfidence in entrepreneurs hinges on individual and contextual factors (Forbes, 2005). Kahneman and Lovallo (1993) argue that illogic forecasts about the future of a business are made in general by business managers and in particular by entrepreneurs since they focus on current and particular conditions and disregard consequences of previous situations that are likely to affect their judgments. In a research on the difference between managers and entrepreneurs' decision-making regarding heuristic and cognitive biases, Busenitz and Barney (1997) argued that the heuristic application among entrepreneurs could result in acceptable solutions that are of high effectiveness and efficiency. However, in an earlier study which became the base of some other research, Tversky and Kahneman (1974) suggested that cognitive biases in entrepreneurs decisions may induce them to come to certain consequences that lack inclusiveness and rationality (Barney, 1984). According to Smith et al (1988) these types of decisions may reduce performance and venture investments. Based on the aforementioned literature, the two primary research questions are:

H1: Is there any difference between entrepreneurs in terms of risk-taking behavior at the time of opportunity discovery?

H2: Is risk-taking behavior in entrepreneurs contingent on formulation of decision problems whether it is manipulated by an opportunity discovery or by general issues?

Research Mythology, Design and Procedure

The research design includes four scenarios of three different non-entrepreneurial tasks (life and death, investment and time) along with one entrepreneurial opportunity task. All the tasks were developed based on risky choice framing in negative vs. positive formats. Each positive and negative format of the tasks was randomly assigned to both groups of entrepreneurs and non-entrepreneurs. As regards the small size of the

sample and nominal scale of measurement, Mann–Whitney (U test) is applied for analyzing the differences among respondents¹.

Entrepreneurs in this study are referred to as experienced individuals who have established a business for at least 5 years and with 8-15 employees (Hornaday and Aboud, 1971). Entrepreneurs were selected from different industries in the city of Tehran. Non-entrepreneurs involved those who had no or little tendency to engage in any business activity. After receiving the list of experienced entrepreneurs (225), five criteria were used based on previous studies in the domain of entrepreneurship (Nicolaou, et al, 2009) to identify the final samples.

The criteria applied to this end are: (1) I usually enjoy thinking about the new ways of doing business activities. (2) I usually recognize opportunities to start a new business, although I might not put them in action. (3) I usually discover new ideas that have potentiality to become commercialized, although I might not put them in action. (4) I usually discover ideas that have capability to turn into profitable businesses. These criteria were ranked in a nominal scale of five (1: never, 2: rarely, 3: sometimes, 4: usually, 5: mostly). Finally, we asked them how many new ideas they had come up with during the last month. Their answers were ranked in a nominal scale of five (1: none, 2: one, 3: two, 4: three, 5: more than three). Based on the opinion of six entrepreneurship scholars, the minimum score for choosing a final entrepreneurs' sample was estimated to be 17 according to those 5 criteria (out of a total score of 25). We started from the highest score down to the candidate number that got 17. Therefore, based on this method, 60 entrepreneurs were chosen. Because the number of entrepreneurs was the cut-off point in our research, we started from the lowest point up to the 60th candidate's score to choose our non-entrepreneurs' sample. In addition, non-entrepreneurs got a very lower score based on the criteria². Half of the participants were randomly assigned to a positive frame and the rest were assigned to a negative frame.

Results

Research results reveal interesting findings about entrepreneur's decision-making under risk situations. Framing effects could not result in contradictory decisions regarding the subject (opportunity) related to entrepreneurs. However, non-entrepreneurs have often taken decisions (whether general or technical) derived from framing effects.

On Death and Life scenario

Entrepreneur's choices are different in the event of life and death under positive and negative conditions (U: 315; $P < 0.05$; N: 60) and framing could properly affect decisions; though, one could observe cognitive biases of loss aversion. This is similar to the case of non-entrepreneurs where they have been affected by framing effects (U: 401; $P < 0.05$; N: 59).

In a positive condition, entrepreneurs had a risk aversion propensity of 57% and a risk-taking propensity of 67% under a negative condition. Therefore, they revealed a deviation rate of 24%. On the other hand, non-entrepreneurs showed a 70% risk aversion under a negative condition while having a 72% risk-taking propensity. This shows a considerable 42% deviation which could be explained by the presence of framing effects. Loss aversion rate was 10% in entrepreneurs compared to the reference point in the prospect theory while in case of non-entrepreneurs this rate was only 2%.

1 Statistical Hypothesis

H0: There is not a significant difference between the choices of entrepreneurs in two options.

H1: There is a significant difference between the choices of entrepreneurs in two options.

² The sum of 60 non-entrepreneur's score was 895 whereas 1210 for entrepreneurs'.

On Investment Scenario

There was no difference observed between negative and positive conditions regarding investment decisions that entrepreneurs made and framing was unable to properly affect the decisions (U: 411; $P > 0.05$; N: 58). However, this was different for non-entrepreneurs as they were greatly affected by framing effects (U: 414; $P < 0.01$; N: 60). Differences were so significant between entrepreneurs and non-entrepreneurs that resulted in different responses in positive conditions. Entrepreneurs had a risk-taking propensity of 60% and 70% under positive and negative conditions, respectively. Therefore, they were risk takers under both conditions. This resulted in only 10% of the decision deviation. There was no effect coming from loss aversion. Non-entrepreneurs showed a risk-aversion propensity of 67% and a risk-taking propensity of 76% under positive and negative conditions, respectively. The effect of loss aversion was 10% from the reference point.

On the Time Scenario

There is a difference between the decisions entrepreneurs make under negative and positive conditions in terms of time in a risk frame. In other words, entrepreneurs are affected by the framing effects (U: 398; $P < 0.01$; N: 60). Framing effects also affect non-entrepreneurs in their decision-makings (U: 302; $P < 0.01$; N: 59). Entrepreneurs showed a risk-aversion propensity of 61% and a risk-taking propensity of 68% under positive and negative conditions, respectively. The effect of loss aversion was 7% with entrepreneurs.

On the Opportunity Scenario

There is no difference between the decisions entrepreneurs make in negative and positive conditions and they are not affected by framing effects (U: 285; $P > 0.05$; N: 60). However, this was different for non-entrepreneurs (U: 345; $P < 0.01$; N: 58) as their decisions were affected by framing effects. Entrepreneurs showed a risk-taking propensity of 67% and 68% under positive and negative conditions, respectively revealing 7% of deviation due to lack of framing effects on their decisions. There was no loss aversion effect observed. In contrast, non-entrepreneurs showed a risk-aversion propensity of 63% and a risk-taking propensity of 70% under positive and negative conditions, respectively revealing 7% of loss aversion equal to 33% deviation.

An interesting point is that from the opportunity point of view, entrepreneurs are thought to have more risk-taking propensity in positive conditions compared to negative ones which is in contradiction to framing effects. This is not true with other issues. Therefore, except for the issues of investment and opportunity, there is no difference between entrepreneurs and non-entrepreneurs in terms of decision-making. Furthermore, the rate of loss aversion is almost 29% for entrepreneurs in the scope of opportunity and investment. This rate is 5 times greater than that of a classic risk frame offered by Tversy and Kahneman (1981). This loss aversion is one of the reasons for high risk propensity in entrepreneurs under a positive frame that exists as stable property in their decision-making processes. This rate of loss aversion has even caused entrepreneurs' risk-propensity rate to be similar in positive and negative conditions with regard to opportunity and investment. Entrepreneurs show more risk propensity under both negative and positive conditions with regard to investment and opportunity compared to death and life in a venture frame. In a venture frame in the context of opportunity, entrepreneurs show more risk propensity under positive conditions compared to negative conditions which does not conform to risky frame basics. However, it has been argued in the framing literature that loss aversion leads to a decrease in risk aversion (Soman, 2004; Thaler, 1999).

Discussion and Conclusion

When we intend to maximize the utility of our decisions, they should not be dependent on the way they are provided. We often seek to maximize the expected utility but we occasionally apply different types of

heuristic cognitions. Therefore, the utility (interpretable by our selections) is different from virtual utility (experienced) of our decisions. For instance, we ignore slight differences between items, integrate consequences to increase attractiveness rate of items to ourselves, base our decisions on the most important aspect, overweight losses than wins, seek simple reasons when making choices, and consider consequences in relation to the most appropriate reference point including presupposed or previous situations. That is why we cannot consider all criteria, meaning that our senses and attention could be manipulated. It sounds rational to apply most of these revelations and save time by precluding intricate and cumbersome analysis processing. If we apply them consciously, then we may avoid their serious dangers. For instance, whether a product development strategy is depended on a reference or previous point and/or actually it is based on heuristic opportunity etc. heuristics become highly dangerous if people are convinced of their subjective values or feel obliged to use them regardless of other data sources or decision-making tools. Having bias toward using such heuristics for a long time may result in perfect opportunity loss. In this event, people are unaware that these are at best only convenient rather than optimal and standard tools. As previously mentioned, those who are more inclined to apply cognitive and intuition biases are the ones that are more likely to engage in entrepreneurial activities (Busenitz and Barney, 1997). The clear differences observed between entrepreneurs and non-entrepreneurs in terms of the decisions they make as revealed in most of framing questions indicate that the first group uses their intuition in a different way. Therefore, it seems that entrepreneurs use cognitive intuition and biases more deliberately and consciously. As mentioned in this section about learning in entrepreneurs, if it is an inseparable part of an entrepreneurial process, then coping with loss problems is something they could learn over time and this increases the loss aversion effect. Thus, negligible differences in risk propensity between negative and positive conditions for entrepreneurs spring from the fact that they are provided with modified risk. Therefore, they are faced with less contradiction in decision formatting. One may argue that some cognitive biases in entrepreneurs are of higher stability and some of them are modified through experience and learning processes.

Researches recognize entrepreneurs as sophisticated individuals that evaluate risk (Palmer, 1971). On the other hand, research on framing has indicated that meticulous individuals are less inclined toward framing effects in contrast to holistic ones (Leboeuf and Shafir, 2003; McElroy and Seta, 2003). An entrepreneur has an analytical mind, particularly when business related opportunities are concerned. They are able to identify differences between unfulfilled needs. This considerably helps them recognize opportunities. Shane (2003) argues that entrepreneurs are able to opportunistically form situations and detect opportunities without doing any search. They can learn over time and improve their analytical ability. This helps them to be able to simultaneously consider different states of a phenomenon. If this phenomenon is a problem involving framing effects, then they can considerably decrease it (e.g. when encountering a negative framed problem, the positive aspects come to mind, too). It was shown in this paper that the group of entrepreneurs was more stable and compatible in decision-making. Therefore, it is recommended that the future research investigate the different frames of decision-making in various subjects and their relation to entrepreneurial consciousness in order to consider entrepreneurial consciousness and opportunity recognition from a new point of view.

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Appendix 1 (The Research Scenarios)

Imagine a rare disease has begun to spread, and 600 people's lives are being seriously threatened. For it, there are two possible types of cures:			
Plan 2	Plan 1	(1) if plan 1 is used, 200 people will be saved (400 people will die) (2) if plan 2 is used, there is a one-third probability that 600 people will be saved (no one will die), but also a two-thirds probability that no one will be saved (600 people will die)	Life Vs. Death
Imagine you have invested 600 million Rials in a company, and the company is claiming bankruptcy. They have two options:			
Plan 2	Plan 1	(1) if you use plan 1, you will save 200 million Rials (lose 400 million Rials) (2) if you use plan 2, there is a one-third probability that you will save 600 million Rials (you won't lose any money), but also a two-thirds probability that no money will be saved (you will lose 600 million Rials)	Investment
Imagine you are temporarily called by your company to participate in an obligatory event. Although you are extremely unwilling, you still must go, and you must stay 6 h. According to a company worker's results however, the assignment that needs to be finished may be easier than expected. Consequently, there are two possible plans			
Plan 2	Plan 1	(1) if you use plan 1, you can leave 2 h earlier (you have to stay 4 h) (2) if you use plan 2, there is a one-third probability that you can leave 6 h earlier, but also a two-thirds probability that you won't be able to leave early at all (you have to stay all 6 h)	Time
Imagine you have discovered an opportunity by offering your product to a thirsty market that has not met such product because you have exclusive technological knowledge. Your market analysis supports strongly minimum revenue of 12000 million Rials. In order to gain this amount of money you have to ask a venture capitalist to support your business plan financially. You find an old investor and start the project but the person passes the way. His inheritors come to you and want to suspend the contract but in this condition the court of law give the right to continue the contract but you need to update the percent of interest with the new investors (inheritors) which for sure jeopardize the revenue of 12000 million Rials.			
Plan 2	Plan 1	(1) if you use plan 1, you will save 4000 million Rials revenue (lose 8000 million Rials revenue) (2) if you use plan 2, there is a one-third probability that you will save 12000 million Rials revenue (you won't lose any revenue), but also a two-thirds probability that no money will be saved (you will lose 12000 million Rials)	Opportunity