

A NOTE ON GENDER DIFFERENCES IN STRATEGIC RISK-TAKING: A BUSINESS GAME SIMULATION EXPERIMENT

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ABSTRACT

This study presents the results of a business game simulation experiment. In particular, the risk-taking behavior of males and females were investigated. The results suggest that female decision makers may show higher levels of "anticipated regret." In addition, under the positive state of good financial performance feedback, decision-makers regardless of gender pursued more conservative strategies than decision makers operating under negative financial conditions. This supports the "law of effect" hypothesis. Statistically significant gender differences were evident, however. Under conditions of positive feedback, females resisted strategies that varied from previous successes, opting for more conservative strategies than their male counterparts. This finding may be explained by notions of "experienced regret."

INTRODUCTION

Strategic decisions, almost by definition, are risk-based decisions under the veil of uncertainty, or even ignorance, combining both a "fuzzy" problem domain and an ill-defined payoff structure. In such cases of ill-defined problems the decision maker's underlying attitudes and propensity towards risk will influence the evaluation and subsequent selection of a solution (Shapira, 1998). Decision makers, when confronted with uncertainty, typically restructure ill-defined problems in order to solve them (Von Winterfeldt and Edwards, 1986), and the way they are structured depends upon many personal factors (Raiffa, 1982). Some authors, for example, (e.g., Mann, 1994; Ronay and Kom, 2005) have suggested that females tend to view risk as potential loss, while males associate risk with opportunity. While there is certainly substantial debate about these gender related issues, meta-analyses of gender-based research by both Arch (1993) and Byrnes et al (1999) have found important gender differences in risk taking. More recent research has found that other factors, such as peer group pressure (Ronay and Kim, 2005) and ambiance (Magan and Hinsz, 2005), may also influence the fundamental gender/risk-taking relationships.

THE NATURE OF RISK

Understanding risk, in simple terms, starts with variation around the mean of a probability distribution; however, the theoretical measurement of risk taking propensity is extremely complex and exacting, involving estimations of individual utility curves. Strategic decisions, however, involve multiple objectives, are sequential and future oriented, and typically involve various forms of feedback. Under such conditions, other factors often bundled under the rubric of "risk-taking", are used to explain behavior. In addition, "risk averseness" is often confounded with issues of decision "regret" (Larrick and Boles, 1995; Zeelenberg et al, 1996). Seminal work by Bell (1982) and Loomes and Sugden (1982) brought the concept of regret to the forefront of risk taking decision theory. Regret is experienced when it turns out that another decision should have been selected. Regret theory, by its very nature, involves emotions -- if I make the wrong decision, how painful will be my regret? Classical regret theory suggests that individuals will incorporate aspects of "anticipatory regret" in their decisions based upon "anticipated" feedback. However, strategic decisions also involve sequential "actual" feedback, which evokes another type of regret, that is, "experienced regret" (Zeelenberg and Beattie, 1997).

The complex nature of risk taking and management decision making presents a fundamental empirical dilemma. In spite of our complex and multi-dimensional understanding of risk taking in management (see Shapira, 1998; Wiseman and Gomez-Mejia, 1998), most empirical studies have taken, and continue to take, a rather simplistic view of risk taking. The core of many of these empirical studies involve administering instruments designed to measure risk-taking (an "explicit measure"), such as Wallach and Kogan's choice dilemma questionnaire (CDQ), to a class of individuals such as entrepreneurs (i.e., Masters and Meier, 1988) or to examine how individuals differ in their choices within a simple hypothetical written scenario (an "implicit measure", see Ronay and Kim, 2005). These techniques are what Brynes et al (1999) call "hypothetical choice" studies, and while useful for studying a "slice" of the theoretical risk taking pie, they will provide "suspect" conclusions if generalized too far.

In this study, we attempt a "middle" ground of experimental investigation. We explore gender differences and risk taking within a controlled strategic setting using a computerized simulation, we examine gender differences in risk taking in a way substantially different than the vast majority of other research that utilize either survey methodology or simple, single-decision experiments. While using computerized business simulations as an experimental vehicle is not unheard of in social research, it is rare due to extensive programming, testing, and formatting requirements. However, there are several important advantages to computer simulation experiments including essential realism, control, and safety (Muhs and Justis, 1981; Zey, 1981).

METHOD

Experimental Procedure - A Computerized Business Game

Subjects were presented with a detailed common initial scenario of a business situation in the form of a typical computerized business simulation game. Taking the perspective of a new CEO, subjects made a limited set of strategic decisions. The industry was described as high technology, price elastic, and with four competitors all sharing similar strategies, profits, expenses, market shares, etc. It was suggested that one competitor was moving towards a high product quality/high price strategy, another towards a low product quality/low price strategy, and the third towards a medium product quality/medium prices.

Initial conditions were set for stock price, product price, product R&D expenditures, advertising expenditures, and market share. In addition, sufficient information was provided regarding cost of goods sold, general selling expenses, G&A expenses, and tax rates to generate simple income statements. Subjects were told that their objective was to maximize period-ending net income. Strategic variables under the control of the subjects were product price, advertising expenditures, product R&D expenditures, and the choice to enter into a joint venture with one of the three competitors.

The joint venture, if elected as a strategy, would consist of a product R&D agreement with associated costs and benefits. Costs were described as including negotiating and monitoring a contract, and potential risk of technological appropriation to an "opportunistic" joint venture partner. The benefits were said to derive from jointly produced new and better models with increased sales.

Subjects were told that feedback regarding their strategies would be provided after processing the decision inputs using a computerized simulation model. The simulation involved two iterations of the computer model, and three decision periods -- the first using the initial conditions stated above, and the second and third based upon the feedback provided by the computer model after the previous strategies were analyzed.

In the actual experiment, the subjects' decisions were not used to generate the results -- instead, positive or negative financial performance was an experimental treatment. Two different levels of net income

(10% decrease or 10% increase) were randomly assigned to subjects after the first decision period, independent of their strategies. The computer model then iteratively worked backwards from the randomly selected income levels to generate a computerized sales and financial income statement report logically consistent with the inputted decision values of price, advertising, and R&D, a form of computerized “backcasting”. The second iteration also used the 10% increase/decrease of net income. Because of sample size limitations, those subjects receiving a 10% increase/decrease after the first iteration also received another 10% increase/decrease for the second iteration; therefore we had two sets of “feedback” results – increase-increase and decrease-decrease.

At the beginning of the simulation the initial risk propensity was measured by a five item survey based on the choice dilemma procedure of Wallach and Kogan (1964), and refined by (Muldrow and Bayton (1979, p. 102). Choice dilemma procedures are closer to approximating risk propensity based on probability, expected value, and utility curves than instruments based upon agreeing with various statements, such as attitudes towards blind dates or bungee jumping.

SUBJECTS

The simulation was administered to three undergraduate corporate strategy/business policy classes at a large public university. Statistical analysis of biographical data (age, work experience, etc.) revealed no significant gender differences. Also, no statistically significant differences were found for the risk propensity index (mean female score = 2.21, mean male score 2.07). The simulation was administered at the end of the semester, and classes were taught by the same instructor (different from the authors).

RESULTS

Strategies: Decision Period 1 (Pre-Feedback)

The first decision period was based upon the initial set of conditions, prior to any feedback regarding the impact of these strategies. Subjects made decisions regarding pricing, advertising, R&D, and joint ventures.

Pricing, Advertising, and R&D. Given the neutral nature of the competitive context established in decision period 1, there is no a priori theoretical reason to expect gender differences in the initial allocation of strategic resources. In fact, there were only slight gender differences in strategic approach during the initial decision point; only R&D expenditures were statistically significant ($p < 0.10$) with 69% of the females, versus 85% of the males increasing R&D, while pricing and advertising decisions were almost identical. It should be noted that pricing, advertising, and R&D not only represents a strategic decision, but also an information gathering strategy since the subjects knew that feedback was forthcoming, and they would have additional opportunity to adjust these decision variables.

Joint Venture. By design, the joint venture decision did not constitute information search since it was a one-time decision based upon the initial conditions. Also, the joint venture decision, unlike the other decision variables, represents a “strategic partnership,” involving, in theory, significant “transaction” costs including partner search, specifying mutual obligations, and negotiating such obligations (Williamson and Winter, 1993, Kay, 2001). Given the initial conditions of the simulation, however, these costs should not be gender dependent.

Another cost, however, is finding an opportunistic partner who may appropriate proprietary knowledge. If the potential joint venture partner is seen as being opportunistically inclined then contracting costs increase due to the extra need for policing and possible adjudication. In these cases strategic partnerships are less likely (Kay, Robe and Zagnoli, 1987). Since perceptions of potential partner behavior may be

based upon personal factors (Raiffa, 1982), particularly "decision regret" concerns (Scanzoni and Arnett, 1987), gender differences may be relevant.

The data appears to support more of a gender "regret" hypothesis, and not "risk propensity." An ordinary least squares regression model was estimated using joint venture as the dependent variable and as independent variables: gender and risk propensity index ($R^2=0.43$). Only the gender variable (females being less likely to form joint ventures) proved significant ($p<0.05$). As additional evidence, of those females opting for joint ventures 78% selected the "high quality/high price" firm as a partner versus only 52% of the males ($t=1.49$, $p<0.10$). Here "high quality" may give an appearance of a less opportunistically inclined partner. An interesting analogy to the importance of commitment, or non-opportunistic behavior, by the joint venture partner is found in studies of marriage and dating; here gender differences are also evident, and explained by "anticipated regret" regarding the importance and perceived likelihood of partner commitment and "quality" of partner (e.g., Scanzoni and Arnett, 1987). However, this analogy, while enticing, should not be carried too far until further research substantiates any parallels between business partnering and personal partnering.

Strategies: Decision Period 2 (Post-Feedback)

Subjects were randomly assigned either "positive" performance (10% higher income) or "negative" performance (10% lower income), and the computer model iteratively worked backwards to generate sales and income reports that were logically consistent with the inputted decision values. Thirty males and twenty-seven females were randomly assigned to the "positive" performance group, while thirty-five males and twenty-two females were assigned to the "negative" performance group. Provided with this feedback subjects then made another set of pricing, advertising, and R&D decisions. A joint venture was not an option during this iteration.

Two measures of strategic response were developed. The first variable, RPT, measured the propensity to either reverse or repeat the direction of expenditures from the previous decision period, while the second variable, CSRV, examined strategic conservatism based on both direction and percentage increase/decrease of responses.

Gender and performance were factorially varied in a 2 x 2 design, with CSRV as the dependent variable; RPT was examined as proportional data. CSRV data were analyzed using an model examining interactions. Covariate and additional log-linear analyses indicated that the risk propensity index and other biographical variables were statistically insignificant, and for brevity purposes they are dropped from the discussion.

"Positive" vs "Negative" Performance. The effect of the experimental treatment rewarded some decision makers, while punishing others for their strategic decisions. The "law of effect" -- that behavior is a function of its consequences -- suggests that those strategic choices, which were rewarded, are more likely to be repeated. Also, people want to protect a "happy" state, and thus will be conservative in decisions if that decision is connected to the "happy" state (Isen et al, 1982). We therefore expect that subjects assigned to the better performing group will be more likely to repeat their strategies, or respond using other conservative strategies, regardless of gender.

The "law of effect" or "happy" state hypothesis is strongly supported. For the "positive" performance group only 26% (RPT/n) of the subjects followed reversal strategies in decision period 2, while 71% of the subjects assigned "negative" performance reports developed reversal strategies ($p<0.01$). Similar results are found when looking at strategic conservatism. For the "positive" performance group the mean value of CSRV, 3.59, is significantly less than the 4.90 mean CSRV for the "negative" performance group ($p<0.01$).

Gender Differences. There are no significant main effects on the gender variable; this is not surprising since the performance treatment provides the important gender related hypotheses -- positive performance provides "value" to be either protected or used, while negative performance primarily provides "information" relevant for future decisions.

As noted above, some authors have argued that females may view risk more as a potential loss function. If this is so, we would expect gender differences in both the propensity for strategic likely to "protect" their good fortune – a form of higher degrees of “experienced regret.” For the "negative" performance group no gender differences are hypothesized since there is "nothing" to protect and the decision maker must continue searching for successful strategies regardless of personal value differences or decision “regret” concerns.

Analysis of interactive effects supports this hypothesis. Females were less likely than males to follow risky strategies after obtaining positive feedback from prior strategic decisions. For RPT, 35% of the males versus 17% of the females made strategic reversal decisions ($p < 0.10$); likewise CSRV averaged 4.05 for males and 3.09 for females ($p < 0.05$). As expected, for the negative feedback group, the propensity toward reversal strategies is almost identical, with 70% of the males and 72% of the females reversing prior decisions; for CSRV females had a slightly higher mean score, although statistically insignificant.

Strategies: Decision Period 3 (Post-Feedback)

The final iteration of the simulation resulted in another increase of 10% in net profit for those who received an increase in the first iteration (a positive-positive performance), and an additional decrease for those with a decrease in the first iteration (a negative-negative performance). In effect, the 2nd experimental treatment rewarded and punished to an even greater degree.

"Positive-Positive" vs "Negative-Negative" Performance. The "law of effect" hypothesis is supported again. For the "positive-positive" performance group only 13% (RPT/n) of the subjects followed reversal strategies in decision period 3, while 94% of the subjects assigned "negative" performance reports developed reversal strategies ($p < 0.01$). Similar results are found when looking at strategic conservatism. For the "positive-positive" performance group the mean performance group ($p < 0.01$).

Gender Differences. As with the first iteration, females were less likely than males to follow risky strategies after obtaining positive feedback from prior strategic decisions. For the second round, CSRV averaged 2.89 for males and 1.45 for females ($p < 0.05$); differences in RPT, although in the hypothesized direction, were not statistically significant. As expected, for the negative feedback group, there was no statistically significant difference.

CONCLUSIONS

This study supports the argument that both gender differences and gender similarities are evident in strategic decision making behavior. Using a computerized business simulation as an experimental vehicle, several relationships were suggested. First, females acting as strategic decision makers, although sharing essentially equal risk taking attitudes (based upon a risk propensity survey), were still far less likely to pursue joint venture strategies. This suggests female decision makers may perceive a high overall contract cost associated with joint venture strategies, possibly caused by emphasizing the potential of opportunistic behavior by joint venture partners (an "anticipated regret" issue).

Second, under the positive state of good financial performance feedback, decision-makers regardless of gender pursued more conservative strategies than decision makers operating under negative financial conditions. This supports the "law of effect" hypothesis. Statistically significant gender differences were evident, however. Under conditions of positive feedback, females resisted strategies that varied from previous successes, opting for more conservative strategies than their male counterparts. This finding may also be explained by notions of "experienced regret."

Third, under conditions of uncertainty where greater amounts of critical information remained to be discovered, such as unexplained poor performance (second and third decision periods) or immediately following deregulation (first decision period), no gender differences were noted in strategic behavior. Given the narrow limits of this research this suggests that information search behavior in competitive environments may be gender independent.

In conclusion, strategic decision making is a complex process involving ill-defined problem domains and a vector of multiple decision variables. While it may be premature to extend the results of this research much beyond its experimental setting, the study offers several intriguing conclusions -- primarily that the often attempted effort of classifying females or males as being less or more risk prone may be far too simplistic. In fact, there are several different issues at play -- propensity toward risk, anticipatory decision regret, experienced regret, and information search strategies. While it is beyond the scope of this research to examine the possible underlying causes for gender differences in regret, this research provides some evidence that male and female decision makers may not differ much on risk propensity or information search, but rather on dimensions of "decision regret." These differences, however, may dramatically influence the pattern of competitive decision making.

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