

**Perspectives on
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and Decision-Making**

Edited by
Wing Hong Loke



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
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*Dedicated to my parents,
Loke Woh Hee and Kum Po Sheng*

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PECUNIARY ASPECT OF RISK TAKING: ARE SINGAPOREANS MORE RISK AVERSE THAN AMERICANS?

Tapen Sinha

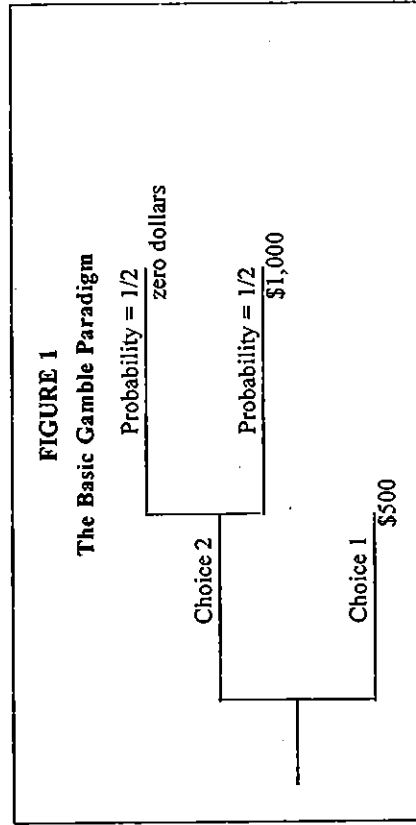
There is a general belief that Singaporeans are more risk averse than their American counterparts. Using samples of students from an American university and from the National University of Singapore, it is shown that given identical contexts in well-specified experimental environments, there is no difference in risk taking between the two groups.

Are Singaporeans more risk averse than Americans? We shall attempt to answer this question. The question has a very practical economic aspect. It has been asserted by many researchers that the lack of indigenous entrepreneurship (and dominance of multinationals) in Singapore, unlike other Asian NICs, is primarily due to the lack of risk-taking character of Singaporeans. It is said that the American entrepreneurs are successful because they are willing to take risk whereas Singaporeans are not (e.g., Krause, 1987). As to why such a difference should exist, there are many explanations. One of the frequently quoted reasons is cultural. It is said that Singaporeans, being mainly ethnic Chinese, are more cautious than their Western counterparts. But this argument is rather weak. For, then, the same argument can be applied to the people from Taiwan and Hong Kong with equal force. The other argument is in the "folklore": it says that the education system in Singapore teaches the students to be risk averse and only the risk averse students succeed. Casual observations seem to be at odds with this argument: the successful products of Singaporean environment seem to thrive in the educational systems of Australia, U.K., and U.S.A. If the Singaporean system bred only risk avoiders, this observation is problematic. The purpose of our experiment is to shed some light on the alleged difference in risk taking between Americans and Singaporeans. However, to date, there has not been an explicit difference found between the two culturally different groups using a direct method.

For measuring risk, two different strands of literature have developed over the last 30 years. The first one was developed by (social) psychologists in the late 1950s. The genesis of that literature can be traced to Kogan and Wallach (1964). These researchers developed a series of 12 choice dilemmas in which subjects were asked to advise 12 different individuals in highly dissimilar settings. For example, one situation describes a prisoner of war who has two choices. The first choice is to live as a prisoner for the rest of his life where life will be very unpleasant. The second

choice is a risky one. He can try to escape. This risky choice has two possible outcomes (with given probabilities). He escapes or he is caught. If he is caught, he gets executed. The subject of the experiment is asked to advise the individual at what minimum probability of success he should try the risky choice. Although the payoff for escaping is freedom, it is risky. There are several difficulties with this approach. First, the subjects may have difficulty in playing the roles of a brain surgeon/pilot/prisoner of war/concert pianist etc. in different questions as he/she might have no experience in those roles; second, alternating between roles can cause confusion and transference from one setting to the next might occur; third, typical choice dilemma questions do not have completely specified consequences. For example, a person is asked the probability of success he would require for recommending a career as a brain surgeon without being explicitly told the monetary benefits of becoming a brain surgeon. Thus, the difference in responses across individuals may solely be due to different assumptions of the respondents about these unknown consequences.

The second method is to measure risk directly. There was only one study that attempted to measure risk taking directly. This was undertaken by McCrimmon and Wehrung (1986). Their procedure to obtain the measure of risk aversion was to ask the respondent to declare an amount of money which made the respondent "indifferent" between that choice and another risky choice. The choices are essentially the same as in Figure 1. The dollar amount in choice 1 was left blank and the respondents were asked to fill it in. The disadvantage of this method is that the individual would have to be very sophisticated to comprehend the questions fully and respond appropriately as the notion of "indifference" is not obvious to naive decision makers. In our experiment, we avoid this problem by offering a series of binary choices.



The aim of our experiment was to find an amount $\$x$ (in choice 1 of Figure 1) such that the individual liked (in the case of gains) or disliked (in the case of losses) the choice of $\$x$ and a risky choice of a gain of a fixed dollar amount (we chose two scenarios with \$1,000 and \$10,000, respectively) with a 50% chance. The experiment was designed so that the $\$x$ was revealed by a series of iterative binary choices.

Method

Subjects. We used two samples: one came from ($N = 71$) American students from the University of Wisconsin. These second-year University students were enrolled in the Principles of Economics course; the other was a sample of Singaporean students ($N = 69$; ethnic Chinese). These first-year students at the National University of Singapore were enrolled in an Elementary Statistics course in the Department of Economics and Statistics. Neither group had any previous exposure to or training in Decision Theory.

Stimuli. Stimuli were elementary lotteries (p, x), which were described verbally to the subjects as prospects of receiving or losing x dollars with probability p and nothing with probability $1-p$ and as the prospect of receiving x dollars with certainty in the case of $p = 1$. Specifically, as in Figure 1, the respondent could pick choice 1 or choice 2. Note that choice 1 was an elementary lottery with $x = \$500$ and $p = 1$ and choice 2 was an elementary lottery with $x = \$1,000$ and $p = 1/2$.

Procedure. There was one session with each subject. The session lasted between 10 minutes and 30 minutes. To begin with, each subject was seated in front of a computer terminal. On the screen, a situation was described verbally and diagrammatically (as in Figure 1). The first situation was described as follows:

"You are boarding an airplane with luggage worth \$1,000. There is a 50% chance that the luggage will be lost forever. You have the following choices:

Choice 1. You buy an insurance policy that reimburses you the full \$1,000 if the baggage is lost. But the premium for that insurance will cost you \$500.

Choice 2. You do not buy the insurance policy. In this case, you have a 50% chance of losing \$1,000 (conversely you have a 50% chance of losing the luggage)."

The respondent was then asked to "key in" either choice 1 or choice 2. Depending on the choice, the value of the premium was raised or lowered. A method of iteration was adopted so that the choices got "closer and closer" (in terms of the preference of the respondent). For example, if in the above situation the respondent picked choice 2, the premium in choice 1 was lowered to \$400. If on the other hand, the respondent picked choice 1, the premium was raised to \$600. By such manipulations, the successive difference between premia became smaller and smaller and the individual eventually became "indifferent" between the choices (this method of eliciting choice was suggested by Keeney and Raiffa (1976)).

Each respondent had to face four such situations. Two of them involved losses (of \$1,000 and of \$10,000) and the other two involved gains (of \$1,000 and of \$10,000). In each case the loss or gain probabilities were kept at the simplest level of 50% each. Each respondent also entered some background information about himself/herself (the questions asked were about age, sex, family income, family size, gambling habits).

The respondents, on the average, exhibited risk aversion for gains and risk-taking behavior for losses. These findings are consistent with the Prospect Theory of Kahneman and Tversky (1979). However, the correlations between the loss situations and gain situations were very low. Thus, the results are not consistent with the reflection hypothesis proposed by Kahneman and Tversky. The asymmetry of losses against gains have also been reported in the literature (e.g., Cohen, Jaffray, & Said, 1987). It should be noted that we have not made use of any behavioral model in our analysis.

Second, we carried out a one-way ANOVA test for each of the four questions by classifying them as Americans and Singaporeans. In each case, no statistically significant difference emerged (p. 25).

Third, we carried out a test for equality of means (after testing for equality of variances). None of the equality of means between the Americans and Singaporeans could be rejected (p. 25).

Finally, to check whether there was a difference in response between males and females, we carried out the ANOVA and means tests within each sample. No significant difference was found (p. 40). There is a considerable body of literature discussing male/female difference in risk taking (Tan, 1988; Ginsburgh & Miller, 1982). There seems to be no evidence in the difference in risk taking between males and females in most age groups (except in children).

Discussion

From the tests performed it may seem that the variation within each sample may be large and therefore the statistical insignificance of all the effects discussed so far are the result of "noise in the data." However, a closer examination reveals that such a presumption is false. For example, we carried out a regression analyses of the certainty equivalent sums on the family incomes for the four situations, the results were statistically significant in all the four cases (for L1 and L10, $p < .05$ and for G1 and G10, $p < .01$). These regression results indicate that family income is an important determinant for the choices made by the respondents.

In summary, we note that we did not find any evidence to the hypothesis that risk taking among Singaporeans is any different from risk taking among Americans given the same set of choices in well-structured environments.

One potential criticism for the cross-cultural study with dollars and cents could be that one U.S. dollar is not equivalent to one Singapore dollar. Hence, our comparisons are invalid. In defense, we can provide two arguments: (a) the average family income in the two samples are quite close (of course, the U.S. sample is in U.S. dollars and the Singapore sample is in Singapore dollars); in general, per capita income in the U.S. (in U.S. dollars) was very similar to per capita income in Singapore (in Singapore dollars) in 1987; (b) casual observations tend to confirm the similarity in pricing in the two

Summary statistics of the respondents are reported in Table 1. It also provides means and standard deviations for the certainty equivalent sums for each of the four questions (the certainty equivalent for the situation with the loss of \$1,000 was called L1, the certainty equivalent for the situation with the loss of \$10,000 was called L10, the certainty equivalent for the situation with the gain of \$1,000 was called G1, and the certainty equivalent for the situation with the gain of \$10,000 was called G10).

First, we tested to see if the individuals were risk neutral! on the average, that is, we tested to see if the mean for situation 1 and 3 deviated from \$500 (the expected value of gambles 1 and 3 are $\$500 = (1/2) \times 1,000 + (1/2) \times 0$); similarly, we tested to see if the mean for situations 2 and 4 deviated from \$5,000 (the expected value of gambles 2 and 4 are $\$5,000 = (1/2) \times 10,000 + (1/2) \times 0$) significantly. In all four cases, we were able to rule out risk neutrality ($p < .001$) strongly.

TABLE 1

Means (Ms) and Standard Deviations (SDs) of the Experimentally Assessed Certainty Equivalent Sums and Social-Economic Characteristics of the Subjects

Sample 1: American Students (N = 71)

Variable	Mean	SD
Age	20.48	4.12
Income	29,450.00	22,189.00
Dependents	1.92	2.01
G1	411.55	245.90
G10	3,697.18	2,449.66
L1	383.66	225.95
L10	3,309.86	1,999.23

Sample 2: Singaporean Students (N= 69)

Variable	Mean	SD
Age	21.10	2.17
Income	21,785.00	14,196.00
Dependents	1.87	1.54
G1	401.22	366.95
G10	3,702.11	2,034.19
L1	322.73	321.22
L10	3,601.46	2,555.23

countries. For example, a can of Coca Cola costs 60 to 70 U.S. cents in Chicago and 60 to 70 Singapore cents in Singapore. There are many other comparable items similarly priced.

Therefore, we can presume that the Singapore dollar in Singapore is treated the same way as the U.S. dollar in the United States (without too much error). This can be taken as a justification for using the "dollar numbers" in the experiment without any modification.

A second question can be raised about the applicability of the method in general. Specifically, we know from the study of Hershey and Schoemaker (1985) that certainty equivalent method of eliciting preference is very context specific. Thus, the results from the above experiment may not be immediately translatable to other contexts. In other words, based on the above experiment, it would be inappropriate to declare that there is no difference in risk taking between American and Singaporean university students.

There is a third and general criticism about the incentives of telling the truth by the respondents for hypothetical gambles described above. It has been shown by Binswanger (1981) that the results typically do not alter even if actual payments are made to the subjects.

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decision making under uncertainty and is concerned with the application of formal decision-making techniques to public sector problems.

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