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# The Effect of Social and Temporal Distance on Risk Preferences: An Experimental Investigation

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## ABSTRACT

This paper focuses on a pilot study which seeks the effects of two psychological distances, temporal and social distance, on risk preferences. The experimental design is constructed for four treatment groups to find out these effects. This experimental study examines how delayed resolution of risky options influence individual choice and decisions made on behalf of others. The results show that individuals are risk averse for their current and future decisions. However, there is a significant increase in their risk aversion when they are making a decision for the future. These discrepancies in risk preferences occurred due to gender differences.

KEYWORDS: Risk Preferences, Social Distance, Temporal Distance, Gender Differences, Experimental Investigation

## INTRODUCTION

Individuals may make more risky decisions on behalf of other people in some situations where the results are not immediately available and there are no immediate consequences as well. Assessing and measuring the risk preferences of individuals over other people's payoff are critical for both economic analysis and policy prescriptions. Previous researches suggest that risk preferences are free parameters and individuals may have different risk attitudes (Kahneman and Tversky, 1979). When we consider risky decisions made on behalf of others, the variation in risk preferences gets even more complicated.

There is a body of research coming from social psychology and economics which shed some light on risk attitudes of individuals when they decide on behalf of others. According to Chakravarty et al. (2011), individuals take more risk than they usually do for themselves, when they make a decision on behalf of others. On the other hand, Reynold et al. (2009) find that individuals make less risky decisions for others than themselves when the reward amount is very small. However, when there is a high reward, they do not find any significant difference in risk preferences between the decisions that are made for self or for others. Stoner (1961), Wallach et al. (1962) and Kogan and Wallach (1964) propose the 'Risky Shift Phenomenon' concept. According to these studies, individuals tend to take more risk than they usually do, when they are in a group. Ertac and Gurdal (2012) focus on the gender difference, and they find that men take more risk than women do, when they make a decision on behalf of a group.

Pollmann et al. (2014) measure how the ex-ante and ex-post accountability affect the risk-taking of an agent. Accountability, in which they let the principal reward the agent based on their content from investment, is reducing the amount of risk taken by the agents.

Researchers also attempted to explain the effect of intertemporal variation in risky behavior. Sagristano et al. (2002) and Savadori and Mittone (2014) suggest that individuals make more risky decisions when they are told that the outcome of the decision will be resolved in a future time.

According to Trobe and Liberman (2003), the construal level theory (CLT), psychological representation of information depends on ‘‘psychological distance”, that is, on whether the relevant information refers to the near or distant psychological space. CLT is defined under four main dimensions: temporal, social, spatial and hypothetical distance. Thus, one can phrase decisions made on behalf of others as “social distance” and a delayed resolution of a lottery as “temporal distance” according to CLT. CLT also suggests that risk neutrality is more strongly associated with others, who are also construed at a high level, whereas risk seeking and risk avoidance are more strongly associated with the self, which is also construed at a low level. Thus, increase in risky behavior while one decides for other (social distance) can be explained by CLT since individuals generally behave risk averse for their selves.

In this paper, we study the characteristics that affect a person’s risk attitudes when she decides on behalf of a stranger and when the outcomes of their decisions are resolved in the future. Specifically, we measure how temporal distance together with social distance would affect the risky decisions made by individuals.

The remainder of this paper is organized as follow: Section 2, provides an experimental design in detail. Section 3, reports the results of four different treatments. We also present our results for gender differences as well. Finally, concluding remarks and a research agenda are discussed in Section 4.

## EXPERIMENTAL DESIGN

One way to reveal risk preferences is the multiple price list (MPL) method, which has been used previously and popularized by Holt and Laury (2002) (e.g. Charness et al. 2012). Each subject is presented with a list of 10 decisions between paired gambles which we call lottery A and lottery B. These two lotteries for each decision are displayed in rows. The participant is then asked to choose between two lotteries, either A or B for every decision row. Table 1 illustrates the basic payoff matrix presented to subjects.

**Table 1**. The Ten Paired-Lottery Choice Decisions

| Lottery A | | | | Lottery B | | | | Expected Values | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Chance | Payoff | Chance | Payoff | Chance | Payoff | Chance | Payoff | $EV^A$ | $EV^B$ | Difference |
| 0.1 | $20 | 0.9 | $15 | 0.1 | $40 | 0.9 | $1 | 15.50 | 4.90 | $10.60 |
| 0.2 | $20 | 0.8 | $15 | 0.2 | $40 | 0.8 | $1 | 16.00 | 8.80 | $7.20 |
| 0.3 | $20 | 0.7 | $15 | 0.3 | $40 | 0.7 | $1 | 16.50 | 12.70 | $3.80 |
| 0.4 | $20 | 0.6 | $15 | 0.4 | $40 | 0.6 | $1 | 17.00 | 16.60 | $0.40 |
| 0.5 | $20 | 0.5 | $15 | 0.5 | $40 | 0.5 | $1 | 17.50 | 20.50 | -$3.00 |
| 0.6 | $20 | 0.4 | $15 | 0.6 | $40 | 0.4 | $1 | 18.00 | 24.40 | -$6.40 |
| 0.7 | $20 | 0.3 | $15 | 0.7 | $40 | 0.3 | $1 | 18.50 | 28.30 | -$9.80 |
| 0.8 | $20 | 0.2 | $15 | 0.8 | $40 | 0.2 | $1 | 19.00 | 32.20 | -$13.20 |
| 0.9 | $20 | 0.1 | $15 | 0.9 | $40 | 0.1 | $1 | 19.50 | 36.10 | -$16.60 |
| 1.0 | $20 | 0.0 | $15 | 1.0 | $40 | 0.0 | $1 | 20.00 | 40.00 | -$20.00 |

The payoffs of each row remain constant, but probability pairs are changed which directly affects the expected value of each lottery. As one moves down in the table, the chances of the higher payoff for each option increase. For example, in the first row lottery A pays $20 with probability 0.1 and pays $15 with probability 0.9, thus the expected value of lottery A is $15.50 ($EV^A$). Although the expected values are not shown to the subjects, they are reported in Table 1. Similarly, the first row pays $40 with probability 0.1 and pays $1 with probability 0.9 for lottery B. Therefore the expected value of lottery B is ($EV^B$) $4.9. The expected value of lottery A is greater than the expected value of lottery B, and the difference between these two lotteries is equal to $10.60 for the first row. As one moves down, the expected value of both lotteries increase but the raise of lottery B is much faster than then the raise of lottery A. Therefore the expected value of lottery B becomes greater than the expected value of lottery A, for the each row after the fourth one. In fact, for the decision in the tenth row, lottery A pays $20 for sure and lottery B pays $40 for sure. Under the assumption of local non-satiation, the last row is added to test whether subjects understood the instructions. Two subjects who failed to switch to lottery B in the last row are excluded from the data set.In this pilot study, the payoffs were hypothetical and each subject was informed explicitly about this point. Therefore these hypothetical payoffs were not be paid to them. They had also explained that the researchers are interested in what they would do if they actually faced these choices and they were asked to think about their choices carefully.

They had introduced four different decision tasks. The first task required them to make decisions for themselves, where the result of the lotteries will be learned immediately *(Self+Now).* The second task included making decisions for one's self, where the result of the lottery choice will be learned in three months (Self+Future) (please see Savadori and Mittone, 2014 for an analysis of different temporal distance). The third task asked them to make decision o behalf of a stranger in their university, where the result of the lottery choice will be learned immediately *(Other+Now).* The fourth and the last asked them to make decisions on behalf of a stranger in their university, where the result of the lottery choice will be learned in three months *(Other+Future).* To be able to eliminate any possible order effect, the order of the tasks is randomized.

The pilot experiments were run in the United States with pencil and paper and the payoff values were in US Dollars. The payoffs were approximately 10 times the baseline prizes offered in experiments of Holt and Laury (2002) and they were all hypothetical. So one would expect to observe somewhat biased risk preferences through the decision task.

The data was collected from East Tennessee State University, and 35 subjects participated in this study. Gender distribution was very balanced; we had 17 male and 18 female participants. Two of the participants failed to understand the instructions, and they were dropped from the data even though the analysis reported in this paper does not change when we do not drop those subjects as well. The decision sheets were handed out before the start of a class in Business, and only volunteer students participated in the study. After the decision sheets are handed out, the instructions are read aloud. The complete instructions are available in the Appendix. While performing the first task, subjects had no information about the next task. The order of the tasks was randomized to eliminate any possible occurrences of the order effect.

## RESULTS

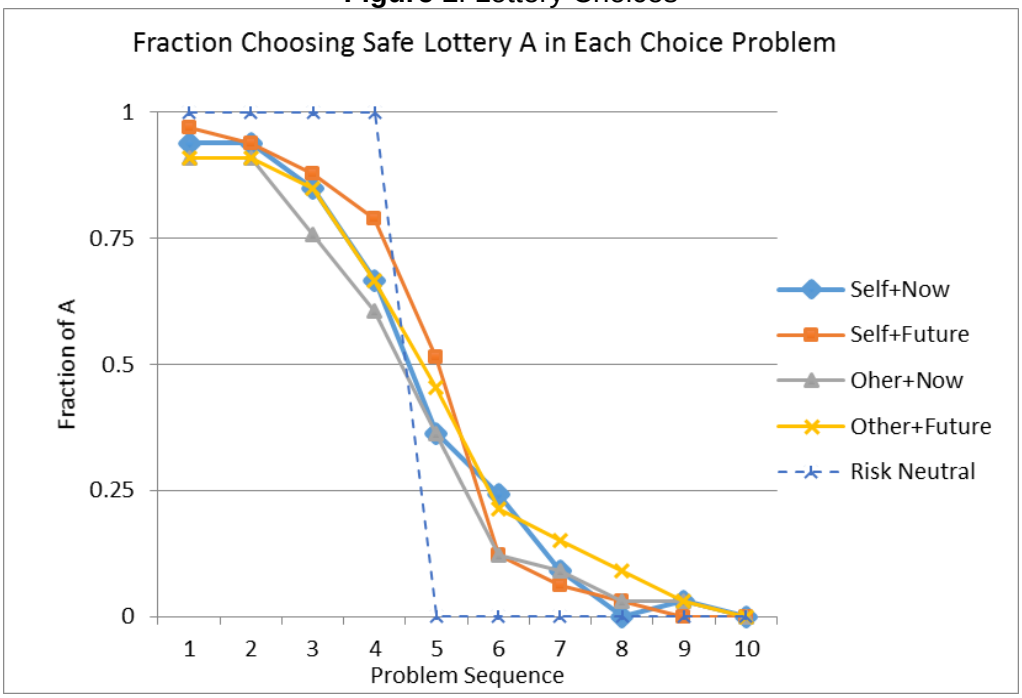
In all of our four treatments, the majority of subjects chose the safe option A in the first rows, when the probability of the higher payoff was small, and then switched to option B without going

back to option A. Only 7 out of 35 subjects switched back from B to A at least once. We did not drop the subjects who switched multiple times in the analysis reported in this paper. The results do not change when we exclude those subjects from the data. Even for these subjects who switched back and forth, there is still a clear distinction between clusters of A and B choices. Therefore the total number of "safe" A choices are associated with risk aversion as it is in Holt and Laury (2002) and Chakravarty et al. (2011). Only 2 out of 35 subjects failed to choose lottery B in the very last row. And those subjects are excluded from the analysis since these subjects failed to understand the instructions.

**Divergence from Risk Neutrality**

We find that individuals are risk averse for their current and future selves which are consistent with the existing literature. However, we realize that there is an increase in subject's risk aversion when they decide about future gambles. Figure 1 shows that the proportion of A choices for each one of the ten decisions. The horizontal axis represents the problem sequence; where the vertical axis represents the fraction of the subjects who chose A from the problem set. The dashed blue line represents the predictions under the assumption of optimum risk neutrality, in which subjects choose A in the first four rows, because the expected value of lottery A is greater than the expected value of lottery B and switch to be in B at the fifth row because the expected value of lottery B is greater than the expected value of lottery A, without switching back. The overall data suggest that subjects are slightly risk lover in *Other+Now* treatment, but this difference is not statistically significant ($p>0.1$; one-sided two sample proportions test and $p>0.1$; one-sided Wilcoxon Mann-Whitney U-test).

**Figure 1**. Lottery Choices




**Deciding Over other People's Money: The Effect of Social Distance**

When deciding on behalf of a stranger, participants were more risk-taking than they do for themselves when the lottery is played and resolved now. The difference is statistically significant

only at the 10 % level (p=0.1; one-sided, two sample proportions test). Table 2 summarizes the total number of "safe" decisions (lottery A) made in each treatment.

**Table 2**. Total Number of A and B Decisions under Each Treatment

| | ***Self+Now*** | ***Self+Future*** | ***Oher+Now*** | ***Other+Future*** |
|---|---|---|---|---|
| **A** | 136 | 142 | 126 | 141 |
| **B** | 194 | 188 | 204 | 189 |
| **Total** | 330 | 330 | 330 | 330 |

Individuals had the same risk preferences for others in the future as they had for their own future selves (p>0.2; one-sided two sample proportions test and p>0.2; one-sided Wilcoxon Signed Rank Test). Figure 2 shows these trends.

**Figure 2**.Self-Other Discrepancy

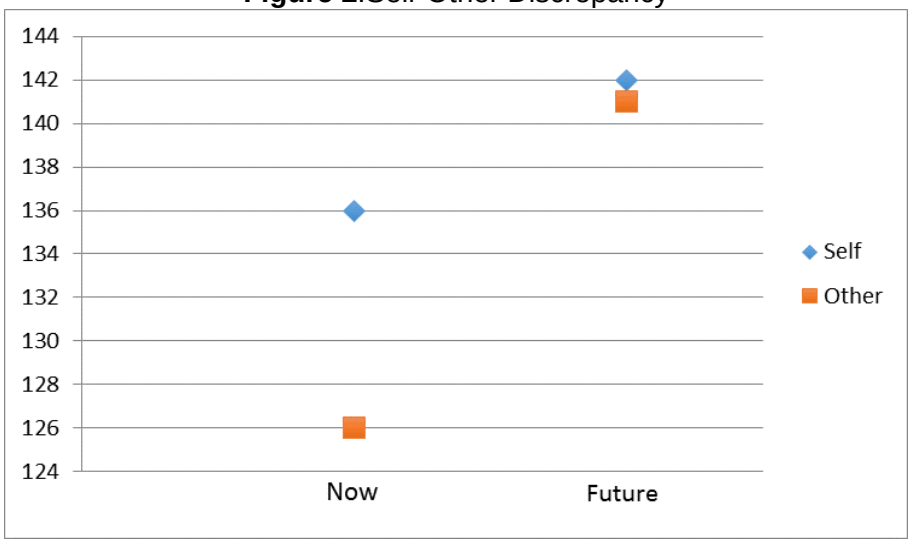



Table 3 reports the risk aversion categories, which depend on the number of safe choices (lottery A) made by each participant (Holt and Laury, 2002). One notable feature of the frequencies in Table 3 is that more than 35 percent of the choice patterns in the *Other+Now* condition involve 3 or less safe choices, which indicates a high level of risk preference when deciding on behalf of other individuals.

**When the outcome is resolved in the future: The Effect of Temporal Distance**

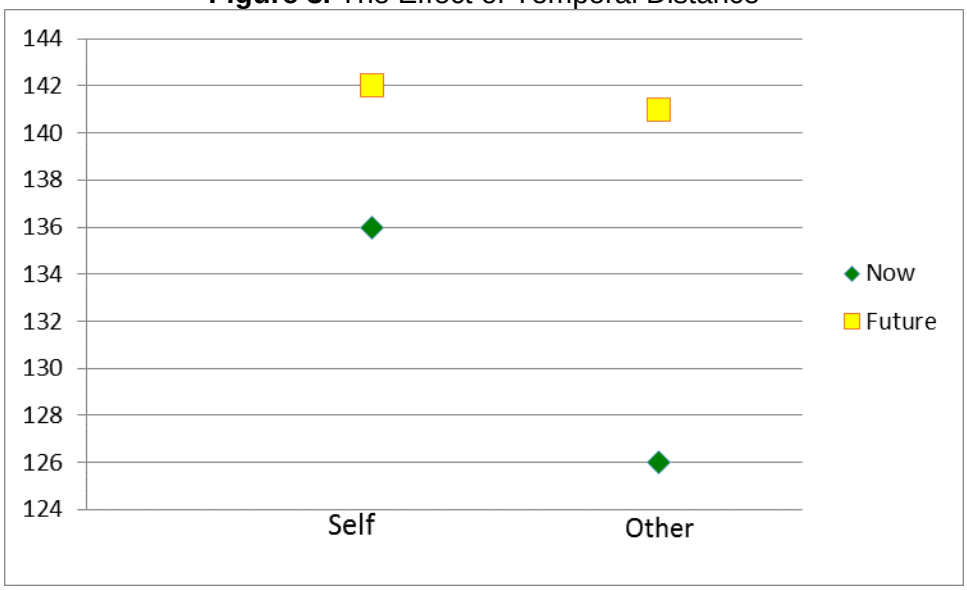
We observe an increase in risk aversion in both self and other tasks when the lottery is resolved in the future compared to when the lottery is resolved now. Subjects behave more risk averse when they move from *Self+Now* treatment to *Self+Future* treatment. The difference is not statistically significant (p>0.1; one-sided Wilcoxon Signed Rank Test).

However, subjects made more risk averse decisions in *Other+Future* treatment with respect to the *Other+Now* treatment. In addition, the difference between these two treatments is statistically significant (p<0.01; one-sided Wilcoxon Signed Rank Test). In other words, individuals balance the uncertainty of the gamble and the uncertainty of the future more while they decide on behalf of others by making more risk averse decisions.

| **Table 3**. Risk Aversion Classification Based on Lottery Choices | | | | | |
|---|---|---|---|---|---|
| **Number of Safe Choices (A's)** | **Risk Preference Classification** | **Proportion of Choice** | | | |
| | | Self+Now | Self+Future | Oher+Now | Other+Future |
| **0-1** | highly risk loving | 0.06 | 0.06 | 0.09 | 0.09 |
| **2** | very risk loving | 0.06 | 0.03 | 0.12 | 0.06 |
| **3** | risk loving | 0.21 | 0.09 | 0.15 | 0.12 |
| **4** | risk neutral | 0.30 | 0.36 | 0.30 | 0.21 |
| **5** | slightly risk averse | 0.12 | 0.33 | 0.18 | 0.33 |
| **6** | risk averse | 0.15 | 0.06 | 0.06 | 0.06 |
| **7** | very risk averse | 0.09 | 0.03 | 0.06 | 0.09 |
| **8** | highly risk averse | 0.00 | 0.03 | 0.03 | 0.03 |
| **9-10** | stay in bed | 0.00 | 0.00 | 0.00 | 0.00 |

Figure 3 shows that individuals tend to behave more risk averse over future decisions in both self and other conditions. However, as reported above, subjects were more responsive to temporal distance when they were deciding over other people's money then they were deciding for their own payoff. Interestingly, a large portion of this 'higher time-discounting for others' is due to the behavior of women.

**Figure 3.** The Effect of Temporal Distance




**Gender Differences in Risk Preferences**

Women, in general, responded to different treatments ('Self vs. Other' and 'Now vs. Future') more than men did. A surprising finding is that many of the discrepancies in risk preferences under different treatments were due to women. Table 4 and Table 5 summarize the total number of safe choices that women and men made.

Men, in general, did not change their risk preferences under different treatments. It may be due to gender differences in reaction to a lack of monetary incentives. Men may be reacting more when the payoffs are hypothetical (as it was in our design) and caring less about the task they

are performing. This finding, itself, generates another research question: Do men and women react differently to monetary incentives?

| **Table 4**. Total Number of A and B Decisions – Women Only | | | | |
|---|---|---|---|---|
| | **Self+Now** | **Self+Future** | **Oher+Now** | **Other+Future** |
| **A** | 74 | 82 | 67 | 81 |
| **B** | 106 | 98 | 113 | 99 |
| **Total** | 180 | 180 | 180 | 180 |

| **Table 5**. Total Number of A and B Decisions – Men Only | | | | |
|---|---|---|---|---|
| | **Self+Now** | **Self+Future** | **Oher+Now** | **Other+Future** |
| **A** | 62 | 60 | 59 | 60 |
| **B** | 88 | 90 | 91 | 90 |
| **Total** | 150 | 150 | 150 | 150 |

Women behaved more risk taking in *Other+Now* treatment than they did in *Self+Now* treatment ($p<0.2$, Wilcoxon Signed Rank Test and $p<0.15$; one-sided two sample proportions test ), whereas men did not change their decisions ($p>0.2$; Wilcoxon Signed Rank Test). That means women take more risk on behalf of a stranger when the lottery is resolved immediately. However, women's decisions for themselves and other are the same when the lottery is resolved in 3 months.

Both men and women behaved in the same way, slightly risk averse, in *Other+Future* treatment and in *Self+Future* treatment ($p>0.2$, Wilcoxon Signed Rank Test). That means that the risk preferences both men and women have for future selves and for future others are similar to each other and different from their decisions for present selves and present others. This finding is aligned with the findings of Pronin et al. (2008) in which they report that individuals treat others as they treat their future selves.

## DISCUSSION AND CONCLUSIONS

In this study, we explore how social and temporal distances affect risk attitudes of individuals. We find that individuals are risk averse for their current and future decisions. This tendency is consistent with the existing literature as well. However, there is a significant increase in their risk aversion when they are making a decision for the future. In addition, when the subjects are making a decision on behalf of a stranger, they behave slightly risk taking if the lottery is resolved immediately. This finding is consistent with what CLT suggests that social distance is associated with risk neutrality. When the social distance is incorporated with temporal distance, which is the scenario that subjects played the lottery on behalf of a stranger and when the lottery was going to be resolved in 3 months, subjects behaved slightly risk averse. Also, individuals had the same risk preferences for others in the future as they had for their own future selves.

Individuals would have made more risk averse choices when the lottery was resolved in the future. That shows us they discounted the time more for others than for themselves. However the time discounting was in the reverse direction. The subjects made more risk averse decisions for the future, which means balancing the uncertainty of the gamble and the uncertainty of the future.

A surprising result of this study is many of the discrepancies in risk preferences under different treatments were due to women. Women would have taken more risk on behalf of a stranger when the lottery was resolved immediately. However, when the lottery is resolved in the future, their decisions for themselves and the others would be same. In general, men did not differ their risk preferences under different treatments. It may be due to gender differences in reaction to the lack of monetary incentives since our design was based on hypothetical payments. This finding itself poses another research question on gender differences in the effects of hypothetical distance.

This paper is focused on a pilot study which seeks the effects of two psychological distances, temporal and social distance, on risk preferences where there is no monetary incentive. This experiment will be replicated with monetary incentives in the future. Further research will be extended with the measurement of the four main psychological distances as CLT suggests.

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