Trusting Behavior, Risk Preference and Loss Aversion

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***Abstract*—This paper uses experimental methods to study if individual's risk preference or loss aversion will affect people's trusting behavior. The results of the experiment show that individuals' risk preference significantly impacts people's trusting behavior. Compared with other subjects, people who are relatively less risk-averse show a higher degree of trust in others. Moreover, individuals' loss aversion also affects people's trusting behavior, subjects with relatively lower levels of loss aversion exhibit a higher degree of trust in others.**

***Index Terms*—Decision making, loss aversion, risk preference, trusting behavior**

I. Introduction

Trust is one of the fundamental reasons for the formation of modern economic society. Nowadays, trust has not only had a non-negligible impact on the economic development of society (Putnam, 2014; Dasgupta and Serageldin, 2000; Zak and Knack, 2001; Beugelsdijk and Groot *et al*., 2004; Nannestad, 2008; Siegrist, 2019), but has also been inseparable from our daily economic behavior. Hence, it is apparent that trust is closely related to people's lives (Svallfors, 2002). Therefore, the importance of in-depth research on trust is evident.

Trusting behavior, as a virtual research object in trust, the affecting factors of it has significant research value. Bohnet and Zeckhauser (2004) and Bohnet *et al.* (2008) have done experiments on individuals' trusting behavior, finding that betrayal aversion significantly impacts people's trusting behavior. Cox (2003) found that other-regarding preference is also involved in people's trusting behavior. Eckel (2003) and Wilson (2003) show gender and race are determinants of trusting behavior as well.

Additionally, as an important influencing factor of trusting behavior, risk preference has been the focus of research in the past literature. Schildberg-Hörisch (2018) points out that individual's risk preference is stable, which is essential for micro and macro-economic researches. In empirical studies about risk preference and trust, reference Eckel and Wilson (2004); Houser and Schunk *et al.* (2010) studied how risk attitude effects trusting behavior through experiments, but they did not find significant impact of risk preference on trusting behavior in the end. Different from the claim above, Ben-Ner and Putterman (2001), Hardin (2002), Cook and Cooper (2003) all propose that trust and risk are closely related to each other. Going a step further, Ben-Ner and Putterman (2001) argues that risk aversion would affect trusting behavior; and proposes the theory that a greater level of risk aversion leads to a lower degree of trust. Because of the disagreement, this paper re-studies the relationship between individuals' risk preference and trusting behavior with different experimental methods and analysis methods from Eckel and Wilson (2004); Houser and Schunk *et al.* (2010).

According to Eckel and Wilson (2004), the authors did not follow the trust game in Berg and Dickhaut *et al*.'s work (2002), all subjects in the study of Eckel and Wilson (2004) can only do a binary choice, they could not transfer different amounts of money according to their preference. Houser and Schunk *et al*. (2010) classified subjects as risk aversion, risk neutral and risk seeking according to their choices in the multiple price list, therefore, the difference between subjects' degree of risk aversion or risk seeking cannot show comprehensively. In this paper, I use Qualtrics to design the experiment, and all the experiment subjects are recruited through the Internet. Different from Eckel and Wilson (2004), subjects can decide the amount of money transferred (from ¥0- 10, inclusively) to receiver in the trust game by themselves in this study. Moreover, not the same like Houser and Schunk *et al.* (2010), in this study, subjects' risk preference is a relative concept, subjects are not directly categorized into three types according to their choices in the risk preference task. Finally, it is worth mentioning that, in addition to other literatures, this paper studies whether loss aversion is the influencing factor of people's trusting behavior by combining a simple lottery choice task in the experiment to elicit the loss aversion in prospect theory (Tversky and Kahneman, 1992; Kahneman and Tversky, 2013).

According to the experimental results, contrary to null results from Eckel and Wilson (2004) Houser and Schunk *et al.* (2010)'s studies, individuals' risk preference significantly impacts people's trusting behavior. Compared with other subjects, people who are relatively less risk-averse show a higher degree of trust in others. Moreover, it is notable that individuals' loss aversion also affects people's trusting behavior; the experiment results show that subjects with relatively lower levels of loss aversion exhibit a higher degree of trust in others.

The paper organized as follows: Section II contains the procedure and design of the experiment. Then Section III shows the results of the experiment. The final part of the article will conclude with some discussions.

II. Experimental Procedures and Design

A. Experimental Procedures

All subjects were recruited online through the WeChat Platforms and they participated the whole experimental sessions online via Qualtrics. Before the start of all tasks in the experiment, each subject needs to read the instruction of this experiment thoroughly and choose whether to

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participate in this experiment voluntarily. All subjects have the right to quit this experiment at any time and for any reason without restraint. It consisted five parts in the experimental session, which are the first lottery task to elicit risk preference, the second lottery task to elicit loss aversion, the trust game to elicit trusting behavior, the dictator game to elicit altruism and the post-task questionnaire to collect demographics.

After the subjects completed all the five parts, they would be paid based on their decisions and their luck. The participation fee is ¥10 for each subject, and the average total payment is around ¥30. They would be paid via WeChat Transfer.

B. Risk Preference Elicitation Task

In the first lottery task, to collect individual's risk preference, the method applied is the multiple price list generated by Holt and Laury, 2002. To make the task could be understood more easily by the subjects, the multiple price list is modified based on the works of Abdellaoui and Baillon *et al.* (2011), Colasante and Marini *et al.*, 2017. There are 11 lottery tickets in this task, for each lottery ticket, the subject could make a binary decision on choosing either a risky option (Option A) or a secure option (Option B). (See Table I). In general, if a subject is risk aversion, he or she would switch from risky option to secure option between Lottery 1 to Lottery 5. Risk neutral subjects would switch in Lottery 6, and risk seeking subjects would switch between Lottery 7 to Lottery 11. That is, the later the subjects switching their options from the risky to the secure one, the higher the tendency of risk seeking they are.

TABLE I: LOTTERY TASK 1-RISK PREFERENCE ELICITATION TASK

Lottery No.	Option A (Risky)	Option B (Secure)	Decision	
1	50% to earn ¥10 or 50% to earn ¥0	¥0 for sure	☐	☐
2	50% to earn ¥10 or 50% to earn ¥0	¥1 for sure	☐	☐
3	50% to earn ¥10 or 50% to earn ¥0	¥2 for sure	☐	☐
4	50% to earn ¥10 or 50% to earn ¥0	¥3 for sure	☐	☐
5	50% to earn ¥10 or 50% to earn ¥0	¥4 for sure	☐	☐
6	50% to earn ¥10 or 50% to earn ¥0	¥5 for sure	☐	☐
7	50% to earn ¥10 or 50% to earn ¥0	¥6 for sure	☐	☐
8	50% to earn ¥10 or 50% to earn ¥0	¥7 for sure	☐	☐
9	50% to earn ¥10 or 50% to earn ¥0	¥8 for sure	☐	☐
10	50% to earn ¥10 or 50% to earn ¥0	¥9 for sure	☐	☐
11	50% to earn ¥10 or 50% to earn ¥0	¥10 for sure	☐	☐

C. Loss Aversion Elicitation Task

In the second lottery task, to elicit loss aversion of subjects, the method used is adapting the simple lottery choice task created by Gächter and Johnson *et al.* (2021) by changing flipping coins into choosing lottery. There are six lottery tickets in this task, the subjects need to make a binary decision with option A and B. If subjects choose a risky option (Option A), they would have a 50% chance of losing an integer amount of money between ¥2 and ¥7, and a 50% chance of winning an additional ¥6. If subjects choose a secure option (Option B), they will not have any loss or additional gain. (Please see Table II). For the subjects, the more times they choose risky options, the lower degree of loss aversion they will have; and the more times they choose secure options, the higher degree of loss aversion they will have.

TABLE II: LOTTERY TASK 2-LOSS AVERSION ELICITATION TASK

Lottery No.	Option A	Option B	Decision	
1	50% chance to lose ¥2, 50% chance to win ¥6	Nothing to win and nothing to lose	☐	☐
2	50% chance to lose ¥3, 50% chance to win ¥6	Nothing to win and nothing to lose	☐	☐
3	50% chance to lose ¥4, 50% chance to win ¥6	Nothing to win and nothing to lose	☐	☐
4	50% chance to lose ¥5, 50% chance to win ¥6	Nothing to win and nothing to lose	☐	☐
5	50% chance to lose ¥6, 50% chance to win ¥6	Nothing to win and nothing to lose	☐	☐
6	50% chance to lose ¥7, 50% chance to win ¥6	Nothing to win and nothing to lose	☐	☐

D. Trust Game

The trust game is generated from Berg and Dickhaut *et al.*'s work (2002). Subjects play the role of sender, they can decide to transfer arbitrary integer amounts between ¥0 and ¥10 to receiver. In this task, according to work of Cox (2003), Eckel and Wilson (2004), and Houser and Schunk *et*

al. (2010), the measurement of each subject's trusting behavior is determined according to the amounts transferred by the subject to receiver in the trust game. In general, if a subject (sender) has a higher degree of trust in receiver, he or she would transfer more money to receiver in the trust game, vice versa, if a subject only transfers meagre amount of money to receiver in the trust game, it means that the subject has a relatively low level of trust in receiver.

This task is a with-in subject design. That is, each subject would be interact with five receivers and make five trust game decisions respectively[1]. The five receivers are: 1) General Receiver; 2) Same Country Receiver; 3) Male Receiver; 4) Female Receiver; and 5) Computer-Based Receiver.

For General Receiver condition, subjects only know that this receiver is a participant in this study without any other information. For Same Country Receiver condition, subjects know that this receiver is a participant with the same nationality as the subject. For Male Receiver condition, subjects know that this receiver's gender is male. For Female Receiver condition, subjects know that this receiver's gender is female. For Computer-Based Receiver condition, subjects are told that they are not interacting with real participant but with computer. According to Houser and Schunk *et al.* (2010), subjects will face stochastic risk in Computer-Based Receiver condition, in the other four real people conditions, subjects will face trustee's uncertain behavior risk.

E. Dictator Game

The Dictator game is the last interactive decision-making task in the experiment. Cox (2003) shows other- regarding preferences will affect people's trusting behavior. Thus, the belief in people's altruism should take into account when considering individuals' trusting behavior. Therefore, I added the dictator game in addition to the original trust game. The only difference between the dictator game and the trust game is that sender can still decide to transfer arbitrary integer amounts between ¥0 and ¥10 to receiver, however, receiver cannot make any decisions in the dictator game. Forsythe and Horowitz *et al.* (1994), Barr and Zeitlin (2010), Franzen and Pointner (2012) shows that the dictator game can measure people's altruism, and the results of the dictator game are related to people's genuine altruism in reality.

III. Experimental Result

A. Demographics

A total of 121 subjects participated in this experiment; all subjects participating in this experiment were recruited from the Internet. I recruited subjects by posting the QR code of the experiment on WeChat, one of the mainstream social media platforms in China. To ensure that all subjects are rational, I only consider monotonic decision makers in two lottery tasks (risk preference and loss aversion tasks). The number of subjects who make the monotonic choice[2] in both tasks is 89.

In the considered subjects, there are 43 male subjects and 42 female subjects. Besides, there are 4 subjects prefer not to say their gender. The distribution of age is that there are 34 subjects whose age is from 18 to 28; 23 subjects whose age is from 29 and 40; 31 subjects whose age is from 41 to 55; moreover, there is one subject prefer to keep one's age confidentially.

B. Subjects' Risk Preference

For the 89 considered experimental subjects, all of them completed the risk preference elicitation task. Through the experimental data, the mean total times for all 89 subjects choose risky decisions is 5.47, which indicates that, on average, subjects are more inclined to risk aversion, similar to Holt and Laury's work (2002). Fig. 1 shows that the distribution of times subjects choose risky decisions in risk preference elicitation task. In the regression, the number of risky options a subject chooses in the risk preference task is the independent variable; and the degree of people's trusting behavior is the dependent variable.

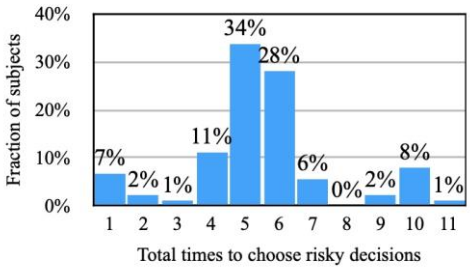

Fig. 1. Distribution of times the subjects choose risky decisions in risk preference task.

C. Subjects' Loss Aversion

According to Gächter and Johnson *et al.*'s work (2021), people's maximum acceptance of loss is the median value of the two loss prices when subjects switch from the last option A to the first option B. The value of λ comes from the loss of the previous lottery before the subjects switch options without considering the probability weighting and diminishing sensitivity. In the regression, the dependent variable is the degree of people's trusting behavior, and the independent variable is the number of risky options a subject chooses in the loss aversion task.

Table III calculates the λ of different decisions in the loss aversion task, the subjects' maximum acceptance of loss under different λ conditions, and the proportion of each type of subject. According to Table III, ten subjects chose option B only on the last lottery ticket and option A on all lottery tickets with the non-negative expected value, accounting for 11.2% of the total subjects. According to the content above, their $\lambda = 1$. There were 13 people who chose option A in all lotteries, accounting for 14.6% of the total number of subjects, and their $\lambda \leq 0.86$. Moreover, five people chose option B in all the six lotteries, accounting for 5.6% of the total subjects whose $\lambda > 3$. Among the subjects, the vast

[1] In General Receiver, Same Country Receiver, Male Receiver and Female Receiver these four conditions, subjects interact with real people. In the Computer-Based Receiver, subjects interact with computer, not real people.

[2] Subjects who have multiple switch points in either lottery task will be considered as irrational and will be excluded from the data analysis.

majority chose option B in the lottery with a positive expected value, accounting for 68.5% of the total subjects.

TABLE III: DISTRIBUTION OF THE LOSS AVERSION MEASURE

behavior of the subjects	Percent	Acceptable loss	λ
Choose B in all lotteries	5.6%	¥ < 2.00	> 3.00
Choose A in lottery 1, Choose B in lottery 2-6	3.4%	¥ 2.50	3.00
Choose A in lottery 1-2, Choose B in lottery 3-6	22.5%	¥ 3.50	2.00
Choose A in lottery 1-3, Choose B in lottery 4-6	25.8%	¥ 4.50	1.50
Choose A in lottery 1-4, Choose B in lottery 5-6	16.9%	¥ 5.50	1.20
Choose A in lottery 1-5, Choose B in lottery 6	11.2%	¥ 6.50	1.00
Choose A in all lotteries	14.6%	¥ ≥ 7.00	≤ 0.86

D. Trusting behavior in Different Treatments

In the General Receiver condition, receivers are totally anonymous to the subjects, and the average transferred amount by the subjects is ¥5.12. In the Same Country condition, receivers and subjects have the same nationality, which means that social distance between subjects and receiver is shorter than it in the General Receiver condition, and subjects' transferred amount is ¥5.40 on average, which is higher than the General Receiver condition. It means that the shorter the social distance is between the sender and the receiver, the higher degree of trusting the sender will be. Although the trend between these two conditions is not significant (N = 89, *p*-value = 0.44, std. error = 0.36), the tendency of the relationship between these two conditions is similar to Eckel's findings (2003).

In the Computer-Based condition, receiver of the trust game is a computer, and the average amount transferred by the subjects is ¥4.38, which is the lowest among all conditions. With the t-test, the difference between General Receiver condition and Computer-Based condition is significant (N = 89, p-value = 0.05, std. error = 0.2), which means that, indeed, like the conclusion of Houser and Schunk *et al.* (2010), there are discrepancies between stochastic risk and trustee's uncertain behavior risk.

E. Individual Trusting behavior, Risk Preference and Loss Aversion

Result 1: When people are relatively lower risk-averse (higher risk-seeking), their degree of trust will be higher. When people behave relatively more risk-averse (lower risk-seeking), their degree of trust will tend to be lower.

In Table IV, according to the regression results, it shows how people's risk preference effect on their degree of trust. That is, the more times subject chooses risky options in the risk preference task, the higher the amount subjects would transfer to a real receiver in the trust game task. By controlling subjects' demographics (such as age, education level, family income and major), this trend still exists. It indicates that people's risk preference has a significant impact on their trusting behavior, which is the higher degree of individuals' risk-seeking, the higher level of people's trust, in other words, the degree of an individual's risk-seeking is positively related to people's trusting behavior.

Result 2: When people behave less loss-averse, their degree of trust tends to be higher; when the people have relatively higher loss-averse, their degree of trust is lower.

TABLE IV: ANALYSES OF RISK PREFERENCE IMPACT ON TRUSTING BEHAVIOR

	General Receiver	General Receiver	Same Country Receiver	Same Country Receiver	Male Receiver	Male Receiver	Female Receiver	Female Receiver
Number of risky option in risk preference task	0.247** (0.120)	0.229* (0.125)	0.321*** (0.118)	0.299** (0.124)	0.220* (0.118)	0.247** (0.123)	0.298** (0.122)	0.327*** (0.126)
Age		−0.00015 (0.327)		−0.114 (0.325)		0.130 (0.322)		−0. 153 (0.330)
Education level		0.073 (0.322)		0.016 (0.320)		0.105 (0.317)		0.255 (0.324)
Family Income		−0.347 (0.312)		−0. 175 (0.310)		−0.031 (0.307)		0.168 (0.314)
Major		0.559 (0.541)		0.087 (0.538)		0.858 (0.533)		0.832 (0.545)
Constant		3.922*** (1.164)		4.032*** (1.158)		2.501** (1.146)		2.128* (1.173)
Obs.	89	88	89	88	89	88	89	88
R^2	0.046	0.071	0.078	0.086	0.038	0.070	0.065	0.106

Note: * p < 0. 1, ** p < 0.05, *** p < 0.01.

General Receiver means that the amounts the subjects transfer in the General Receiver condition, and it is a dependent variable; the explanation of Same Country Receiver, Male Receiver and Female Receiver is the same like General Receiver.

Age is a demographic factor; it is divided into three categories: 18–28; 29–40; and 41–55.

Education level is a demographic factor for the subjects, it is divided into five categories: PhD, Postgraduate, Undergraduate, College education, High school education and below. Family income is a demographic factor as well, it is divided into five categories: Below ¥100,000; ¥100,000–¥200,000; ¥200,000–¥500,000; ¥500,000–¥1,000,000; and Above ¥1,000,000. The last demographic factor major is divided into two categories, which is whether received any education in economics, business or related majors.

In Table V, the regression results show that how people's loss aversion effect on their degree of trust. It means that the more times subjects take risky options in the loss aversion task, the bigger the amount subjects would transfer to a real receiver in the trust game task. By controlling the same demographics as those in Result 1, this trend maintains. Although the effect is not significant in Male Receiver condition, it is significant in General Receiver, Same Country Receiver and Female Receiver conditions. It implies that people's loss aversion has a significant impact on their trusting behavior, which is the lower degree of people's loss aversion, the higher degree of people's trust.

TABLE V: ANALYSES OF LOSS AVERSION IMPACT ON TRUSTING BEHAVIOR

	General Receiver	General Receiver	Same Country Receiver	Same Country Receiver	Male Receiver	Male Receiver	Female Receiver	Female Receiver
Number of risky options in loss aversion task	0.342** (0.155)	0.370** (0.157)	0.332*** (0.155)	0.338** (0.159)	0.067 (0.156)	0.098 (0.160)	0.306* (0.159)	0.342** (0.162)
Age		−0.032 (0.322)		−0.168 (0.326)		0.070 (0.327)		−0.215 (0.333)
Education level		0.118 (0.319)		0.049 (0.324)		0.101 (0.325)		0.287 (0.330)
Family Income		−0.444 (0.307)		−0.289 (0.311)		−0. 109 (0.312)		0.046 (0.317)
Major		0.623 (0.536)		0.113 (0.544)		0.807 (0.546)		0.849 (0.555)
Constant		3.953*** (1.034)		4.636*** (1.049)		3.703* (1.053)		2.894** (1.069)
Obs.	89	88	89	88	89	88	89	88
R^2	0.053	0.094	0.050	0.072	0.002	0.028	0.041	0.082

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
General Receiver means that the amounts the subjects transfer in the General Receiver condition, and it is a dependent variable; the explanation of Same Country Receiver, Male Receiver and Female Receiver is the same like General Receiver.
Age is a demographic factor; it is divided into three categories: 18–28; 29–40; and 41–55.
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A. Trusting Behavior and Altruism

Because the amounts transferred by subjects in the dictator game are based on altruism, Cox (2003) assumes that the amounts transferred by subjects in the trust game is Sa, and the amount transferred by subjects in the dictator game is Sb. Therefore, by calculating (Sa-Sb), subjects' altruism can be excluded from trusting behavior and the remaining part is the "pure trust" of those subjects.

In the dictator game task, on average, subjects' transferred amount is ¥3.26, which is much lower than the transferred amount ¥5.12 in the General Receiver condition of trust game task, the different part is ¥1.86, which is the so called "pure trust" on average level. When using the number of risky options subjects chooses in the risk preference task or loss aversion task as an independent variable, and using the degree of people's other-regarding preference as the dependent variable. The regression results show [3] that neither risk preference nor loss aversion has insignificant effect on people's other-regarding preference. That is, in the trust game task, risk preference and loss aversion will only effect "pure trust" but not altruism, which implies that risk preference or loss aversion effect on people's trusting behavior is not due to the impact of other factors.

IV. DISCUSSION AND CONCLUSION

By modifying the experimental design and analysis method, one of this paper's main findings is consistent with the theoretical inference by Ben-Ner and Putterman (2001), which is people's levels of trust tend to be lower when they exhibit comparatively higher degree of risk aversion, and their degrees of trust tend to be higher when they exhibit relatively lower level of risk aversion. In addition, this paper initially finds that loss aversion can also explain people's trusting behavior, that is, people's levels of trust tend to be higher when they exhibit relatively lower degree of loss aversion; conversely, when they exhibit high degree of loss aversion, their levels of trust tend to be lower.

These findings illustrate that although there are significant differences between interpersonal risk and stochastic risk, people will still follow risk preference and loss aversion to guide their behavior when dealing with various types of risk. We can apply these findings into our daily life easily and simply, for instance, people can assess their risk preference to infer their trusting behavior. If a person has a relatively high level of risk seeking, according to the results of this paper, it means that he or she will have higher trust in a stranger, correspondingly, he or she should improve their awareness of fraud, therefore, it will prevent the occurrence of fraud effectively. For financial institutions, they can obtain clients' trusting behavior by analyzing clients' risk preference as well, this will help them to provide clients with more appropriate financial products, for example, clients who have high level of risk preference will also have a high degree of trusting behavior, therefore, these clients will have more trust on the institutions, then institutions can develop them into long-term clients and choose to spend more cost on them. Moreover, government can also build and improve the social credit system through this method, for instance, government can give lessons about how to prevent fraud especially for people who have high level of risk preference, targeted education for this group of people will effectively reduce the losses caused by fraud cases to the entire society.

However, people's trusting behavior is very complex, with many different influencing factors. Therefore, although the previous literature and this paper have found some factors that can affect people's trusting behavior, there are still many other determinants that we have not discovered, so it is worth further studies on trust and trusting behavior.

[3] When the number of risky options in the risk preference task is independent variable, the amounts the subjects transferring dependent variable, the regression result is that N=89, p-value=0.316, std. error= 0.125. When the number of risky options in the loss aversion task is independent variable, the amounts the subjects transferring dependent variable, the regression result is that N=89, p-value=0.294, std. error= 0.162.

CONFLICT OF INTEREST

The author declares no conflict of interest.

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