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The differences in effects of social image by gender using risky dictator game experiments

Running Title: Social image reflected in dictator games

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Conflict of Interest:

There is no conflict of interest.

Data Availability Statement:

The data can be available to corresponding author's homepage:

https://sites.google.com/site/osakiyusuke/

The data and code used in this study is also available upon from the request.

Abstract

Experimental evidence has revealed that females are more prosocial than males. However, we do not know much about what lies in differences in prosocial behavior in gender. The research question of this study is how effects of social image differ by gender and these effects can explain gender differences in prosocial behavior. Social image is a desire to be perceived as fair and is impure motivation behind prosocial behavior. Experimental studies developed various devices to extract social image and observed its existence in dictator game experiments. However, these methods are not suitable for our purpose because we need to measure the effects of social image, not just existence. This study conducted the risky dictator game in which dictators do not care about their social image because recipients cannot infer dictator's allocation. By adding social image, we prepare the two types of risky dictator games with and without social image. We measure social image based on differences in amount and probability of positive allocation in risky dictator game experiments with and without social image. This study observed differences in effects of social image by gender. We draw conclusion that social image is a cause for gender differences in prosocial behavior.

Keywords: Dictator game, gender differences, prosocial behavior, risk, social image

1. Introduction

Contrary to the assumption of Homo economicus, we are not purely self-interested and often act prosocially. The dictator game (DG) is a popular experimental tool for investigating prosocial behavior (Engel 2011; provided a meta-analysis). There exist not only pure motivations behind such prosocial behaviors but also impure ones. Social image, the desire to be perceived as a good person, is one such impure motivation. It has been revealed through various devices in DG experiments that social image influences prosocial behaviors.

Experimental evidence has revealed gender differences in prosocial behavior (a meta-analysis by Doñate-Buèndia, García-Gallego, and Petrović 2022). Females tended to be more prosocial than males. What leads to these gender differences in prosocial behavior? However, definitive answer to this question cannot be provided at present. Social image is a possible cause of gender differences. However, little is known about how social image differs according to the gender. This study attempted to bridge this gap by analyzing how the influence of social image differs by gender.

To answer this question, we use risk to extract the influence, which is called risky DG. In a risky DG, the recipients' payoffs are determined probabilistically, and their probability depends on the allocation by dictators. Because recipients cannot infer allocations from their final payoffs, dictators do not need to consider their social image. By disclosing recipients to the allocation as a treatment, we can add a social image to the risky DG and measure its effects by the difference in allocation in the risky DG experiment with and without social image.

We observed that social image influenced the prosocial behaviors of female participants, but not male participants. It also reduced the allocation of female, but not male, participants. Gender differences in prosocial behavior disappeared in the risky DG when social image was absent. Our experimental observations suggest that social image is a cause of gender differences in prosocial behavior.

In the existing literature, we can classify two groups using the method with variant DG experiments to extract the influence of social images. One group introduced devices for extracting them. For example, Dana, Cain, and Dawes (2006) categorized this group and provided an outside option not to participate in DG experiments by paying some amount in their endowed money. The outside option is a device that extracts the influence of a social image. Broberg, Ellingsen, and Johannesson (2007) and Andreoni and Bernheim (2009) also used the method in the first group. Risk is used to reveal impure motivations. Exley (2016) found that risk is used as an "excuse" not to behave prosocially. Another group extracts influences by controlling for social distance (Hoffman et al. 1994). For example, in double-blind settings, dictators are not concerned with their social image. Thus, we can determine the influence of social images by comparing the level of allocation to a standard DG.

Our method has three advantages over previous studies. First, our method has no framing effect because dictators make decisions using the same procedure, except for the levels of social image. Second, our method can measure the effects of social image, not just to reveal its existence. Third, our method considers individual characteristics that can be used as control variables to extract the influence of social image unlike double-blind settings.

A few studies have examined gender differences in social image. Klinowski (2018) is classified as the first group that uses devices to extract social image and observed that female participants retracted their allocations more than male participants when retraction was not detected. Alevy, Jeffries, and Lu (2014) is classified as the second group and found that compared with the double-blind setting, there was a significant increase in the probability of positive allocations in the DG only for male participants. These findings are contradictory: Klinowski (2018) finds that the females are influenced by social image, whereas Alevy, Jeffries, and Lu (2014) find that male are influenced. Our findings support Klinowski's (2018) findings and further enrich our understanding. Social image does not have any influence on male, but only female participants. It decreases the proportion of zero allocation and increases the allocation of female participants.

The remainder of this paper is organized as follows. Section 2 presents the two hypotheses, describes the tasks faced by the participants, and explains the experimental procedure. Section 3 reports the findings of the study. First, the overall results are reported, followed by the results for each sex. Finally, section 5 concludes the paper.

2. Experimental Design

In Subsection 2.1, we present two hypotheses on how social image influences dictator allocations. In Subsection 2.2, we describe the risky DG faced by task participants. Participants were divided into two groups based on their level of social image: control and treatment. In the treatment group, social image was added to the risky DG.: Subsection 2.3 explains the experimental procedure.

2.1. Hypotheses

This study measured prosocial behavior based on the amount and probability of positive allocations. We presented two null hypotheses regarding the relationship between prosocial behavior and social image.

Hypothesis 1. The average allocation in the treatment group is not significantly different from that in the control group.

Hypothesis 2. The probability of a positive allocation in the treatment group is not significantly different from that in the control group.

The results of existing studies suggest that people care about their social image in dictator game experiments. Thus, we expect that social image will promote prosocial behavior, the average amount of allocation, and the probability of positive allocation. If we observe the expected results above, this means to succeed the replication of the past observations. This is evidence for the validity of our experimental methods.

We then examined how the influence of social image differed by gender. Previous studies have reached different conclusions regarding gender differences in social image. Thus, we could not make predictions regarding gender-related differences. Previous studies do not say much on the extent to which social image influences prosocial

behavior, even if gender differences are confirmed. Our method can examine whether and how the influence of social image differs according to sex.

2.2 Task Description

Dictators were given 100 points and asked how much they allocated to recipients. When dictators give away $x \in [0,100]$ points for recipients, they leave $100 - x$ for themselves. The recipient payoffs are risky and depend on the allocation of x. They received 100 points with a probability $\frac{x}{100}$ and nothing with a probability $1 - \left(\frac{x}{100}\right)$.

The experimenters prepared a black box filled with x yellow chips and $100 - x$ white chips. The number of yellow chips was the amount allocated by the dictator. In the control group, the recipients drew one chip from the box. If participants drew a yellow chip, they received 100 points; otherwise, they received no points. The recipients did not know the number of yellow and white chips in the black box. This indicates that dictators in the control group did not care about their social image.

The procedure in the treatment group is the same as the control group except for one thing. In the treatment group, the recipients observed the number of yellow and white chips in the black box before drawing a chip. Because of this device, dictators may be concerned about their social image, as recipients can observe the number of yellow and white chips. Except for recognizing social image, dictators made decisions under the same procedure between the control and treatment groups. Thus, our experimental method was not affected by framing effects.

2.3. Procedures

In both groups, dictators were assigned 100 points. The value of one point was 20 JPY, which was approximately 0.13 USD per/exchange rate on June 1, 2024 (1 USD was approximately 157 JPY). We categorized the two groups according to their social image levels. All the games were identical for both groups. The only difference was in the level of social image. In the groups with and without a social image, we informed or did not inform recipients of the number of points allocated by their dictators. Participants were randomly assigned to one of two groups.

The experiment was conducted at the Center for Experimental Economics, Kansai University, from October 2016 to January 2022. The experiment consisted of 10 sessions: five sessions in the control group and the other five in the treatment group. Of the 294 students who participated in our experiments, 147 played the role of dictators and the remaining 147 played the role of recipients. We informed the participants of the two roles (dictator and recipient) in the experiment, but they did not know with whom they were paired. We recruited participants using the ORSEE online recruiting system (Greiner, 2004). The participants had not previously participated in a DG or a variant experiment.

All the participants signed a consent form before participating in the experiment. All participants in each session gathered in one room and communication among them was banned. The experimenter explained the content of the experiments based on the instructional materials distributed among the participants. The same experimenter explained the content of all sessions. To ensure that the participants in each group understood the experimental procedure, the experimenter displayed a movie relevant to

the assigned groups to explain the procedure.

After the instructions were explained, they were required to take a test to confirm that they fully understood the content of the experiment. In this test, participants were asked what the dictator and recipient recognized about the risky DG, including the resulting payoffs. Those who made mistakes were asked to answer questions again. After confirming that all participants had correctly answered these questions, the experimenter explained the solution to all participants. The experimenter did not mention any topics other than the content; for example, the participants did not know who participated in the two groups or the purpose of the experiment.

Participants were randomly assigned the role of either dictator or recipient through a lottery system, and the role remained unchanged throughout each session. After the recipients were informed of the instructions, the researcher took them to another room. This experimenter is a different person who explained the instructions. Dictators made decisions regarding the tasks in the original room. At least one of the experimenters was present in each room, and the participants were monitored to ensure that they did not communicate with each other. In the treatment group, the experimenter informed participants about the allocation before placing the chips in a black box.

There are two other tasks in the experiment: a standard DG and a different type of risky DG. We use a random payment system. The payment is based on the results of one DG randomly selected from the three. The random payment method is widely accepted in economic experiments. In this study, we discuss the results for a risky DG, as described in the previous subsection.

The experiments continued for approximately three hours, including the time required to administer a questionnaire after the completion of the experiments. It includes

the time to inform the number of points individually when one of risky DGs is selected for the payment. Participants' average payment was 2,917 JPY, including a participation fee of 2,000 JPY.

3. Results

Tables 1 and 2 present the descriptive statistics on the average amount of allocation and the probability of positive allocations, respectively. On average, the dictators allocated 6.808 and 10.544 to recipients of the control and treatment groups, respectively. For males, the average allocation amounts were 6.650 and 8.541 for the control and treatment groups, respectively. For females, the average allocation amounts were 7.000 and 12.667 in the control and treatment groups, respectively.

Figure 1 shows the cumulative allocation distribution of all dictators. Blue and red lines correspond to the control and treatment groups, respectively. The two-sample Kolmogorov–Smirnov test did not show a significant difference in distribution between the treatments. Figures 2 and 3 show the cumulative distribution of male and female dictators, respectively. The two-sample Kolmogorov–Smirnov test did not show a significant distribution difference between treatments for male and female dictators.

We investigated the average allocated amount using other statistical tests. Table 3 presents the results of the two statistical tests for the average allocation amount. First, the allocation amount in the treatment group is not significantly different from that in the treatment group for male dictators (t-test and Wilcoxon test). The Wilcoxon test showed that female dictators allocated more points to recipients in the treatment group than in the control group at the 5% significance level. We also confirmed that the average allocation

in the treatment group was marginally higher than that in the control group using the t-test for all and female dictators and the Wilcoxon rank-sum test for all dictators at the 10% significance level. These marginal effects are confirmed by the regression results in Table 5.

The probability of positive allocation differed between the treatments for female, but not male dictators. As Table 4 shows, the positive allocations of female dictators are significantly higher in the treatment group than in the control group at the 5% significance level. For all dictators, positive allocation was marginally higher in the treatment group than in the control group at the 10% significance level. This result was also confirmed by the probit regression (Table 6).

Next, we summarize our results as follows:

Result 1: For all dictators, the average allocation in the treatment group was marginally higher than in the control group.

Result 2: For all dictators, the probability of positive allocation in the treatment group was marginally higher than in the control group.

We now state the results by gender.

Result 1':

- For male dictators, the average allocation in the treatment group was not significantly different from that of the control group.
- For female dictators, the average allocation in the treatment group was marginally

higher than that in the control group.

Result 2':

- For male dictators, the probability of positive allocation in the treatment group was not significantly different from that in the control group.
- For female dictators, the probability of positive allocation in the treatment group was higher than in the control group.

4. Discussion and conclusion

The main findings of this study are clear. Only female dictators care about their social image and increase allocations to recipients by its existence. However, male dictators did not change their prosocial behavior when social image was added. These results are consistent with Klinowski's (2018) findings, but not with those of Alevy Jeffries, and Lu (2014).

Our findings enrich our understanding of gender differences in how social image influences prosocial behavior. Females changed their prosocial behavior due to the presence of social image, but males did not. For the allocation of female participants, all statistical tests passed at the 5% level of statistical significance, except for the average allocation by t-test, which only passed at the 10% level. A possible reason for this is that the change in allocation from zero to a small allocation was limited.[1] This can be interpreted as a low payment amount to hide selfishness. The amount of payment to hide selfishness seems too low compared to previous studies such as Andreoni and Bernheim

[1] There are other possible reasons; for example, the distribution of allocation is far from normal distributions.

(2009). The cause of this difference may be whether the amount of payment was exogenously given by the experimenters in previous studies or endogenously determined by the participants in this study. This study evaluated the minimum value of social image. The maximum value is not clear, which can be evaluated in future research.

We can obtain an intuitive understanding of the above findings as shown in Figure 3. For zero allocation, the percentages differed between the control and treatment groups. The difference in the slopes was observed up to 10 of allocations, and the slopes became parallel after 10. This indicates that the difference in the average allocation emerges up to at most 10. This finding was confirmed by statistical tests. The median allocation was higher in the treatment group than in the control group at the 5% significance level. However, the difference in mean is marginal because it is not different at the 5% significance level but is different at the 10% level.

Economic experiments have shown that females are more prosocial than males. Our findings raise a new question about this observation: How different are pure motivations between males and females? We compared the average amount of allocations and the probability of positive allocations of male and female participants in the control group (Tables 1 and 2). There were no statistically significant differences between males and females in the control group in which dictators need not to care about social image. This means that gender differences in prosocial behavior are only caused by social image and pure motivations excluding social image are same with males and females. Although we cannot conclude this finding from our results alone, we believe that social image plays an important role in gender differences in prosocial behavior.

This study has some limitations. We use risk in recipients' payoffs to control for

social image; therefore, our experimental results cannot be directly compared to existing findings under standard DG. All participants were university students; therefore, our results may not be generalizable to people of different ages and/or characteristics. Social image is influenced by many factors such as cultural backgrounds and social norms, and it will be interesting to examine how our results are robust in areas with different cultures and societies. These limitations should be answered in future research.

Why do females care about their social image, but males do not? Does this cause social norms, a cultural nature cultivated by history, or other things? These questions could not be answered based on our experimental results. Thus, future studies should endeavor to answer these questions.

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Tables

Table 1: The average amount of allocations in each treatment. Standard deviations are shown in parentheses.[2]

	All observations	Male	Female
Control	6.808 (11.267)	6.650 (11.988)	7.000 (10.506)
Treatment	10.554 (14.270)	8.541 (15.185)	12.667 (13.363)

[2] For other tables, the values in parentheses are standard errors.

Table 2: The average probability of positive allocations in each treatment.

	All observations	Male	Female
Control	0.438 (0.500)	0.400 (0.496)	0.485 (0.508)
Treatment	0.581 (0.497)	0.405 (0.498)	0.750 (0.439)

Table 3: The result of t-test and Wilcoxon test on the allocation amount.

	t-test (p value)	Wilcoxon test (p value)
All	0.080	0.078
Male	n.s.	n.s.
Female	0.056	0.025

Note: "n.s." indicates not significant.

Table 4: The result of the proportion test on the probability of the positive allocation.

	Proportion test (p value)
All	0.084
Male	n.s.
Female	0.023

Table 5: The regression results. The dependent variable is the amount of allocation. Cluster robust standard errors (clustered by session) are shown in parentheses. The F-value is not significant in the Model (2).

Model	(1) All (n=147)	(2) Male (n=77)	(3) Female (n=69)
Treatment	3.746 (1.979)*	1.891 (3.343)	5.667 (3.036)*
Constant term	6.808 (1.222)***	6.650 (2.533)**	7.000 (2.517)**

Note: Asterisk, *,** and *** represent significant level 1%, 5% and 10% respectively.

Table 6: Probit regression results. The dependent variable is the probability of positive allocation. Cluster robust standard errors clustered by sessions in parentheses. The F-value is not significant in Model (5).

Model	(4) All (n=147)	(5) Male (n=77)	(6) Female (n=69)
Treatment	0.360 (0.133)***	0.014 (2.89)	0.712 (0.363)**
Constant term	-0.155 (0.085)*	-0.253 (0.234)	-0.038 (0.341)

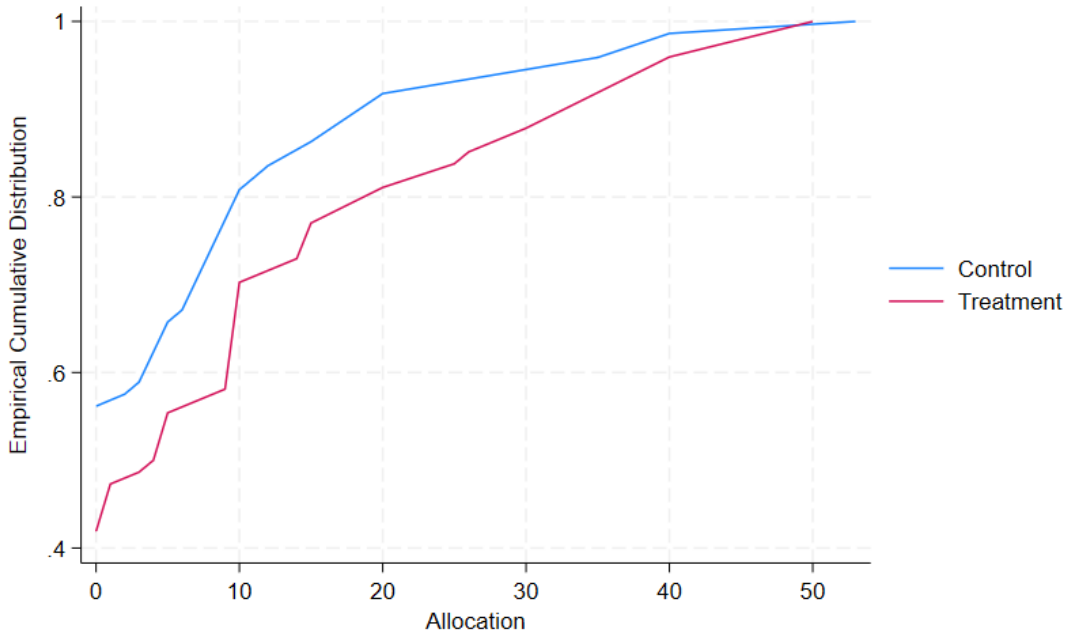

Figure 1: The cumulative distribution of dictators. Two-sample Kolmogorov–Smirnov test indicates that the distribution is not significant between treatments.

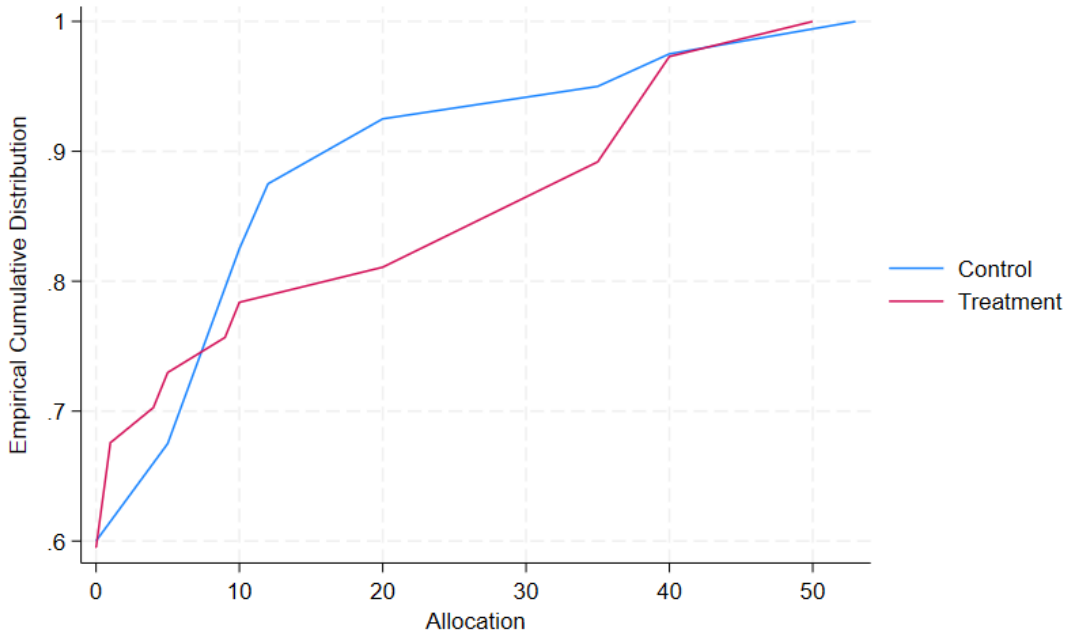

Figure 2: The cumulative distribution of male dictators. Two-sample Kolmogorov–Smirnov test indicates that the distribution is not significant between treatments.

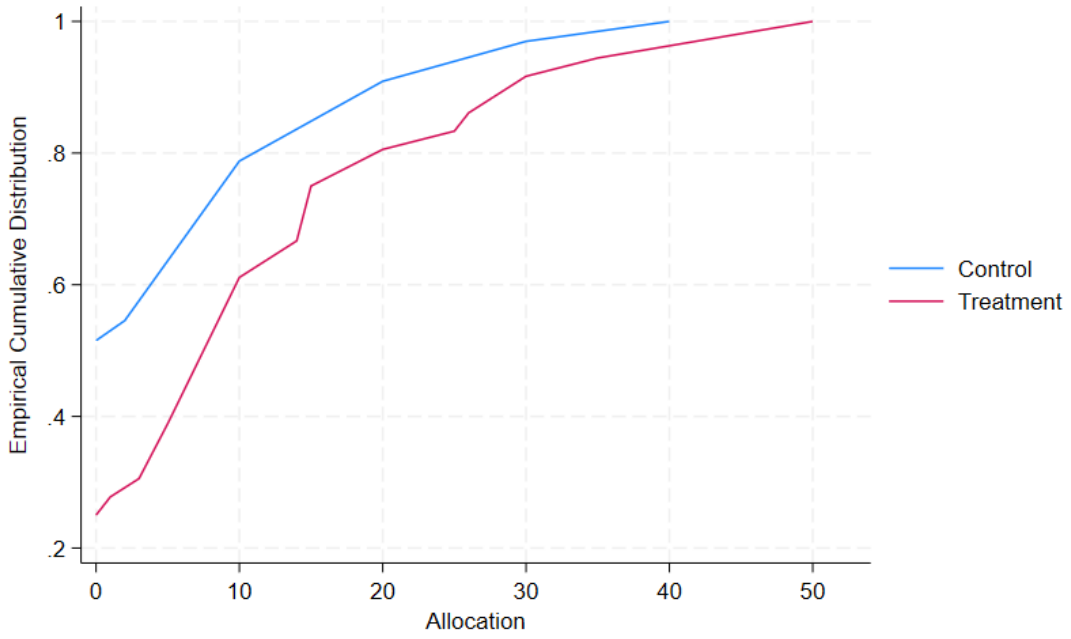

Figure 3: The cumulative distribution of female dictators. Two-sample Kolmogorov–Smirnov test indicates that the distribution is not significant between treatments.