The Belief that Others Think Effort should be Rewarded: Experimental Evidence in Dictator Games

Kazuhito Ogawa[i]
Toru Takemoto[ii]
Hiromasa Takahashi[iii]
Akihiro Suzuki[iv]

Research Group of Economics and Management
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[i] Faculty of Economics, Osaka Sangyo University, E-mail: kz-ogawa@eco.osaka-sandai.ac.jp
[ii] Faculty of Economics, Tezukayama University, E-mail: takemoto@tezukayama-u.ac.jp
[iii] Faculty of International Studies, Hiroshima City University, E-mail: htaka@intl.hiroshima-cu.ac.jp
[iv] Faculty of Literature and Social Sciences, Yamagata University, E-mail: asuzuki@human.kj.yamagata-u.ac.jp

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Kazuhito Ogawa†, Toru Takemoto‡, Hiromasa Takahashi§, and Akihiro Suzuki¶

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Abstract

This paper investigates the belief held by the recipients when they can make an effort in the experimental dictator game. The experimental result indicates that the recipients have the belief that others think effort should be rewarded. Furthermore, when the dictators act differently from the belief, the recipients change the belief and relax their effort.

Keywords: Dictator game; Experimental economics; Belief; Effort

JEL Classification: C78, C91, D63, and D83

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†Faculty of Ecnomics, Osaka Sangyo University

‡Faculty of Economics, Meikai University

§Faculty of International Studies, Hiroshima City University, 3-4-1 Ozuka-Higashi, Asa-Minami, Hiroshima 731-3194, Japan. Tel.: +81-82-830-1500. E-mail: htaka@intl.hiroshima-cu.ac.jp

¶Faculty of Literature and Social Sciences, Yamagata University

1 Introduction

It is frequently asserted that, since farmers make substantial effort for a relatively low income, subsidies should be given to the agricultural industry. However, farmers earn a low income primarily because their hard work is often fruitless. In sum, it can be said that persons advocating agricultural subsidies think that effort should be rewarded–even if the effort is ultimately fruitless–and believe that other people have the same opinion. Do most people share this belief, or is it only the farmers? This paper aims to elucidate the frequency and role of such beliefs through dictator game experiments.

The dictator game is an experimental model used to analyze donation or income transfer. In the dictator game, one player, called the dictator, divides a certain amount of money between himself or herself and another player, called the recipient. Typically, the recipient merely accepts the money and takes no action. As a result, standard dictator game experiments do not reveal the thoughts of the recipient; for this reason, researchers make use of a questionnaire.

It is true that people regarded as recipients, such as disabled people and welfare recipients, will sometimes take action; indeed, recipients must have various feelings towards people whose income is transferred to them (i.e., dictators).

Consequently, this paper adds a "working stage" before the standard dictator game in which the dictator and/or recipient engage in a work task (calculation test).[1] Comparisons of the recipient's actions in the working stage–i.e., the differences in the recipient's score on the calculation test–during different treatments may reveal the recipient's changing beliefs and efforts under the dictator game stage.

Our predictions are as follows: The recipient believes that the dictator thinks effort should be rewarded. If a recipient has such a belief and knows that the dictator will be informed of the recipient's score on the calculation test, the recipient's score will be higher than if the recipient does not have such a belief. When the recipient feels that the transfer from the dictator is small, the recipient is more likely to feel

[1] In the experiment described in this paper, the amount of money given to the dictator and the recipient did not depend on the outcome of the recipient's task.

that the dictator does not think effort should be rewarded, and the recipient will consequently relax his or her efforts, lowering his or her score.

We define effort as the difference in calculation test scores. For example, if a recipient's score is 94 points in one calculation test and 97 points in another calculation test, for example, the recipient's effort in the second test is determined by the difference between the two scores (3 points).

The dictator game originated from a study of a problem in finite-horizon bargaining games (See Ståhl (1972)): observed offers are often more than that of the theoretical solution. Güth, Schmittberger, and Schwarze (1982) tested the offer made to the other person in an experiment of an ultimatum game, which is a two-stage bargaining game. In the ultimatum game, first, player 1 makes an offer $(x_1, 1 - x_1)$. Next, player 2 accepts or rejects this offer. If player 2 accepts it, player 2 gets $1 - x_1$ and player 1 gets x_1. If player 2 rejects it, both players earn nothing. The backward induction outcome of this game is $(1, 0)$, i.e., player 1 gets (almost) everything and player 2 accepts player 1's offer.

However, Güth et al. (1982) showed that mean offers of player 1 are more than 30% of the total amount and that player 2 often rejects offers below 20%. This outcome may be caused by the ability of player 2 to reject offers.

Therefore, Kahneman, Knetsch, and Thaler (1986) experimented with a dictator game where player 2 has to accept any offer made by the player 1. Kahneman et al. (1986) gave player 1 two alternatives, $(\$10, \$10)$ and $(\$18, \$2)$. In the experiment, 76% of the subjects chose even splits. Forsythe, Horowitz, Savin, and Sefton (1994) compared the results of the ultimatum game with those ot the dictator game and obtained a mean contribution rate of about 20%.

Since there seems to be no strategic reason in dictator games, the positive offer rate may stem from altruism. In reality, in almost all the experiments, a positive offer was observed. Cason and Mui (1998) conducted experimental sequential dictator games to observe whether the information content affected the dictators' beliefs and changed their behavior. All the subjects chose their stakes and were informed about their potential counterparts' stake under "relevant treatment" and the day

of the month on which he/she was born under "irrelevant treatment." Then all of them chose the second stakes. Finally, the subjects' role was randomly determined as a dictator or a recipient. As a result, the information difference did not affect their beliefs or behavior; further, under "irrelevant treatment", some of the subjects' stakes were more self-regarding. This was not observed under "relevant treatment". Thus, the relavant information, i.e., the stake of the potential counterpart, constrained some subjects from moving toward more self-regarding offers. For more survey, involving experimental ultimatum and dictator games, see Camerer (2003).

Many recent studies describe experiments that incorporate an additional decision-making stage before the standard dictator game.[2] Cherry, Frayblom, and Shogren (2002) introduced an earnings stage where the dictators answered 17 questions from GMAT before the bargaing. People with high scores received $40 while those with low scores received $10. In Yamamori, Kato, Kawagoe, and Matsui (2008), the recipient declares his desired monetary allotment.[3] Moreover, in Yamamori, Kato, Kawagoe, and Matsui (2007), the dictator and recipient engage in online chat. They show that voice-based communications increase the dictator's donation to the recipient.

Our experiment can be interpreted to have a signaling aspect; this is in contrast to the cheap talk aspect of the experiments mentioned above. Since cheap talk costs nothing, it can be used as a dominant strategy by the recipient to request a large monetary allotment, and it may be difficult to determine the differences in the effort invested by the recipient in such experiments. In our experiment, however, calculation tests require the input of effort–the higher the score desired by the recipient, the greater the effort he or she must make.[4] If the transfer from the

[2]Conducting the experimental dictator game outside the laboratory is another recent trend. For example, Henrich, Boyd, Bowles, Camerer, Fehr, Gintis, and McElreath (2001) conducted dictator game experiments in three small-scale societies: Orama in Kenya, Hadza in Tanzania, and Tsimané in Bolivia. They found the human behavior to be entirely different from the theoretical prediction and also noted that mode of the amount of money donated differed from society to society and was affected by the economic patterns of everyday life in their societies.

[3]Hoffman, McCabe, Shachat, and Smith (1994) assigns the dictator role to subjects who obtained a high score in a knowledge quiz and the recipient role to subjects with a low score in the same quiz.

[4]Gneezy and List (2006) conducted a field experiment to investigate whether workers who earn unexpectedly high hourly wages made more effort than workers who earn average wages.

dictator is small, the recipient may do the calculations without much effort or may choose not to complete the calculation test at all.

This paper is organized as follows: In Section 2, we explain the details of our experiment. Section 3.2 is devoted to the description of the outcome of our experiment. Section 4 concludes the paper.

2 Experiment

2.1 Experimental Design

The entire experiment consisted of two treatments: treatment A and treatment B. Each treatment was divided into a working stage and a dictator game stage. The working stage was immediately followed by the dictator game stage. Furthermore, treatment A was divided into two subtreatments depending on what the dictators did in the working stage: treatment A1 and treatment A2.

During the working stage, the dictators and the recipients were in the separete rooms. During this stage, the recipients were required to complete a calculation test comprising 100 addition and subtraction problems involving two- or three-digit numbers.[5] They were given 20 minutes to complete the calculation test. In treatment A, the dictators were informed of the fact that the recipients had completed their calculation tests. While, in treatment B, the dictators were not informed of that. In treatment A1 and treatment B, the dictators also completed the same test.

After the working stage, the recipients moved into the room where the dictators were sitting, and the dictator game stage began. During the dictator game stage, subjects played the dictator game. In treatment A, the dictators were given the scores of the recipients paired with them at the begining of the stage. In treatment B, the dictators were not informed of that.[6] In treatment A1 and treatment B, each dictator was given a certain amount of money, in accordance with the dictator's

[5]Each subject was randomly assigned the role of either dictator or recipient at the beginning of the session.

[6]The recipients were not informed of their own scores in both the treatment.

score on the calculation test. This given money was the endowment of the dictator game. The relationship between the amount of money given to the dictators and the calculation test score is presented in Table 1. Note that the scores of the recipients had no effect on the amount of money given to the dictators. In treatment A2, each dictator was given JPY 1200 as endowment of the dictator game.

In each treatment, the working stage and the dictator game stage were repeated thrice in the same order. The dictator-recipient pairs were changed randomly in each round. The role of the subjects remained unchanged for the duration of each treatment.

2.1.1 Design of Treatment A

In treatment A, during the working stage, the dictators were informed of the fact that the recipients had completed their calculation tests, and were given the recipients' scores. The following information was provided to the dictators and recipients, who were sitting in separate rooms:

(1) At the beginning of the dictator game stage, each dictator was informed of the score of the recipient paired with him or her, according to the score categories in Table 1.

(2) At the beginning of the dictator game stage, each recipient was informed of the amount of money given to the dictator paired with him or her as an endowment of the dictator game.

(3) The working stage and dictator game stage were repeated thrice in the same order.

(4) The dictator-recipient pairs were changed randomly in each round.

In addition, the recipients were given the following information:

(5) The score of each recipient had no effect on the amount of money given to the dictator paired with him or her.

(6) The recipients were not informed of their own scores.

(7) The dictators earned money on the basis of their scores on the calculation test.

In addition to items (1)–(4), the dictators were informed that they were given money corresponding to their own scores on the calculation test (as shown in Table 1) as an endowment of the dictator game. Furthermore, they were informed that the recipients were aware of item (7).

After completing their calculation tests in an adjacent room, the recipients were moved to the room where the dictators were sitting, where the participants entered their answers to the calculation test into a computer in order to confirm their scores.

2.1.2 Design of Treatment B

In treatment B, the dictators were not informed of the fact that the recipients had completed their calculation tests. Hence, the information given to the subjects during treatment B was the same as that during treatment A, except that the subjects were not made aware of item (1). Furthermore, the recipients were not required to enter their answers into the computer after moving into the room where the dictators were sitting. Treatment B was otherwise the same as treatment A.

2.2 Overview of the Experiment

The experiment was performed at the Kyoto Experimental Economics Laboratory of Kyoto Sangyo University in October 2007, December 2007, May 2008 and July 2009. 84 undergraduate students of Kyoto Sangyo University participated the experiment as the recipients and the same number of the students participated as the dictators.

See Table 2. All the subjects participated in only one session. None of the subjects had previously participated in a dictator game experiment, though some had participated in another experiment. Each session took approximately two to three hours to complete. The amount of money rewarded to the subjects ranged from JPY0 to JPY3600.[7] A copy of z-Tree (Fischbacher (2007)), licensed to Kazuhito

[7]Recipients who had participated in another experiment were rewarded at least JPY2000 in total. Dictators were not informed of this.

Ogawa, was used as the application software for the experiment.

The following details the interaction between the subjects. The dictators and recipients gathered in different places after receiving their role assignments. Next, the dictators were led to room 1 and the recipients were led to room 2, which was next to room 1. Room 1 was divided by partitions into front and rear sections. The dictators sat down in predetermined places in the front section of room 1. The working stages for both dictators and recipients began at the same time. The recipients were moved into room 1, where they entered the answers of their calculations into the computer. Note that they entered room 1 from the rear door and sat down in predetermined places in the rear section. After the end of the dictator game stage, the recipients were moved back into room 2. The dictators and recipients were dismissed at different times. The aim of the procedures mentioned above was to limit the contact between the dictators and recipients as much as possible.

3 Experimental Result

3.1 Overview

Table 3 provides the average score, with standard deviation, of the recipients in every round under each treatment. One recipient under treatment B misinterpreted the instructions, reducing the number of subjects under treatment B to 25.

Figure 1 illustrates the average score of recipients from rounds one to three under both treatments. While the average score of the recipients under treatment A decreased in round three as compared to rounds one and two, there was little change in the average score of the recipients under treatment B over the course of the three rounds.

Since the perfect score of the calculation tests is 100, the analysis may be affected by ceiling effect. We discuss the effect in Section 3.2.

3.2 Analysis

Table 3 and Figure 1 support the following two assertions. First, the average score of the recipients was siginificantly higher in round one under treatment A than in the same round under treatment B (Mann-Whitney test, $p = 0.072$). This indicates that the average score of recipients is higher when a dictator is informed of the score of his or her recipient. The recipients under treatment A therefore exerted greater effort than those under treatment B.[8] This is because the recipients under treatment A anticipated high distribution.

Second, the average score of the recipients under treatment A was siginificantly higher in round one than that in round three (Wilcoxon rank sum test, $p = 0.097$).[9] Clearly, the recipients relaxed their efforts gradually over the course of the three rounds.

Was fatigue the reason for the decreasing efforts of recipients in completing the three calculation tests or was it unsatisfactory distribution from the dictator? In order to verify the cause, we compared the effort put forth by satisfied recipients with that put forth by unsatisfied recipients in round three from the standpoint of round one (that is, the difference in scores between rounds one and three). For example, if the effort put forth by satisfied recipients is positive or zero and the effort put forth by other recipients is negative, the reason for decreasing effort is unsatisfactory distribution by the dictator. On the other hand, if the effort put forth by satisfied recipients is also negative and there is no significant difference between the effort put forth by satisfied and unsatisfied recipients, the reason for the recipients' decreasing effort is fatigue.

We defined a recipient who successfully obtained over 50% of the endowment of the dictator paired with him or her in rounds one or two, i.e., 600 JPY, as a "satisfied recipient". There were four satisfied recipients. The other twenty-three recipients were "unsatisfied recipients". Table 4 and Figure 2 illustrate the average scores of

[8] The same result was observed in round two.

[9] No significant difference was observed between the average score of the recipients in round three under treatment A and that of the recipients in round three under treatment B.

satisfied and unsatisfied recipients. The average score of the satisfied recipients is higher than that of the unsatisfied recipients in every round. In addition, the average score of the satisfied recipients in round three is the same as that in the previous rounds.

Using this classification, we first examined the difference in scores between rounds one and three for both types of recipients. The difference in score for satisfied recipients is not significant (Wilcoxon rank sum test, $p = 0.593$), while the difference for unsatisfied recipients is significant (Wilcoxon rank sum test, $p = 0.086$ and pairwise two-tailed t-test, $p = 0.049$). This result shows that satisfied recipients made greater effort than the unsatified recipients in all the three rounds. Moreover, while the effort level of the satisfied recipients remained relatively constant in all the three rounds, that of unsatisfied recipients decreased by round three. The score difference in round three between satisfied and unsatisfied recipients is significant at the 1% level (Mann-Whitney test).[10] Recipient satisfaction was therefore an important issue. On the other hand, we cannot say that fatigue was one of the causes of the low score, since the difference in the average scores of the satisfied recipients between rounds one and three was not statistically significant.

Since the perfect score of the calculation tests is 100, the analysis may be affected by ceiling effect. The problem caused by the effect is that the existing difference in variables become undetectable. However, we demonstrated significant difference by using nonparametric statistics. Hence, in our case, the ceiling effect is not much difficulty though the bigger difference may be demonstrated if not affected by ceiling effect.

It is natural that the recipients believe that the dictator thinks effort should be rewarded. While the recipients who successfully obtained higher amounts of money from the dictator continued to put forth effort during the calculation tests, other recipients, who became aware of the gap between their effort and the actual result, relaxed their effort. In other words, the recipients who obtained only a small reward from the dictator changed their beliefs.

[10] The score difference in round one between satisfied and unsatisfied recipients is not significant.

4 Concluding Remarks

Although the recipients in typical dictator games usually do nothing, the recipients in our experiment completed calculation tests in order to enable us to understand their beliefs regarding effort and reward. The results indicate that recipients initially believed that the dictators think effort should be rewarded; subsequently, the recipients who were not adequately rewarded by the dictators changed their beliefs to reflect the perceived disparity between effort and reward.

If the recipients believe that the dictators think effort should be rewarded, they will put forth effort to earn high scores. On the other hand, if the dictators think effort should be rewarded, they will donate more money to recipients who have earned high scores. In doing so, the dictators unintentionally reinforce the belief of the recipients, and, as a result, the recipients put forth more effort to earn higher scores and better rewards in upcoming rounds. If the recipients do not believe that the dictators reward effort, the recipients' score on the calculation tests will be poor; when the dictators become aware of this result, they may donate less money to the recipients with low scores, reinforcing the belief that effort is not rewarded.

The belief of economic entities, therefore, directly affects their decision making. In the first round under treatment A, the recipients believed that the dictators rewarded effort, and, as such, these recipients earned high scores on the calculation tests. However, when this belief was not maintained, the average score decreased with each round. Thus, the belief of economic entities with respect to the intent of other entities is an important decision-making factor.

Furthermore, such beliefs can affect the decision-making processes of other entities; for example, when the recipients believe that the dictators think effort should be rewarded, the dictators may give more money to them, and, conversely, recipients lacking such a belief may receive less money from the dictators.

Therefore, when designing a distribution scheme, it is important to investigate the particular beliefs of each party and the kind of relationships exist among these beliefs. The goal of our future research is to develop an appropriate distribution

scheme, that reflects the beliefs of each entity and the various relationships between them.

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Score	Amount of Money
79 or lower	JPY150[11]
Between 80 and 89	JPY300
90	JPY450
91	JPY600
92	JPY750
93	JPY900
94	JPY1050
95	JPY1100
96 or higher	JPY1200

Table 1: Relation between the Amount of Money and Score

Treatment	Number of Recipients
A1	27
A2	33
B	24

Table 2: Experiment Overview

[11]When the experiments were done, JPY1 ≅ USD0.009.

Treatment	Statistic	Round One	Round Two	Round Three
A1	Average	97.3	97.3	94.9
	Median	99	98	97
	Standard deviation	3.2	2.9	6.4
A2	Average	97.4	97.9	96.5
	Median	98	98	98
	Standard deviation	3.3	1.8	6.0
A	Average	97.4	97.6	95.8
	Median	98	98	97.5
	Standard deviation	3.2	2.4	6.2
B	Average	95.4	95.6	95.0
	Median	96	95.5	97
	Standard deviation	4.0	3.9	4.1

* Figures in parentheses are the standard deviations.

Table 3: Average and Median Score of Recipients

Treatment	Number of datum	Statistic	Round One	Round Two	Round Three
Satisfied	18	Average	99.1	98.7	98.4
		Median	99.5	99.0	98.5
		Standard deviation	1.1	1.3	1.5
Unsatisfied	26	Average	98.8	98.0	96.3
		Median	99.0	98.5	98.0
		Standard deviation	1.2	2.3	5.7

* Figures in parentheses are the standard deviations.

Table 4: Average and Median Scores of Satisfied and Unsatisfied Recipients under Treatment A

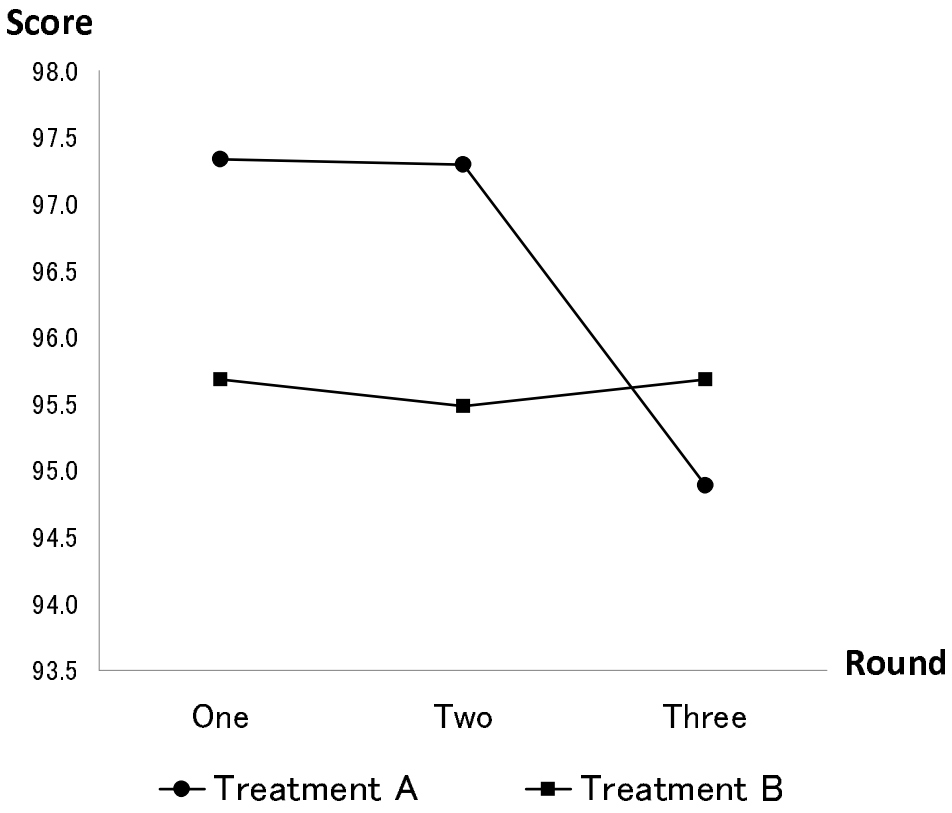

Figure 1: Average Score of Recipients

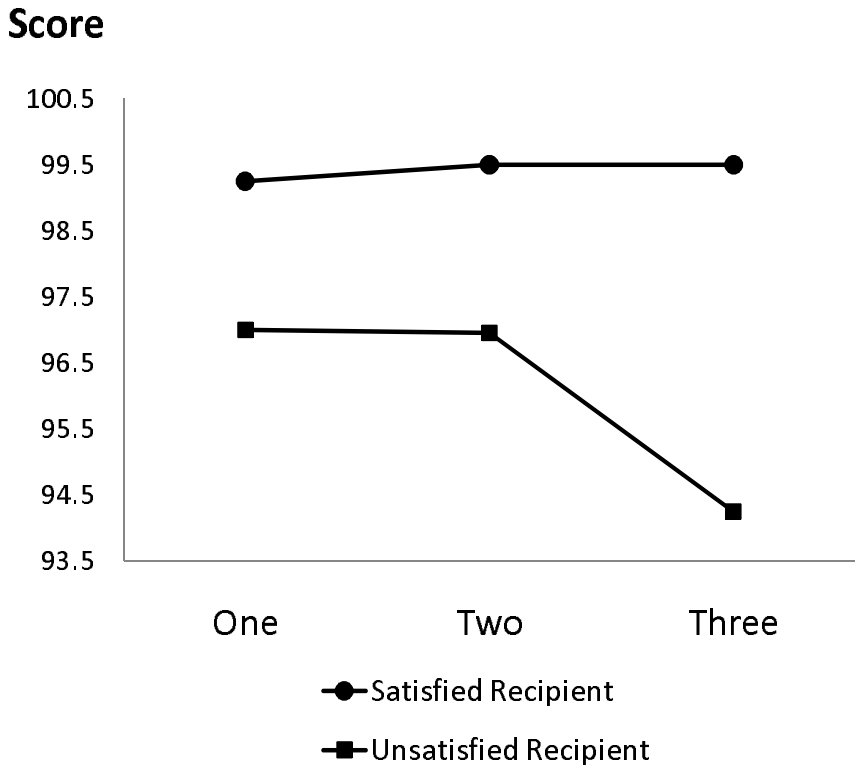

Figure 2: Average Scores of Satisfied and Unsatisfied Recipients under Treatment A