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Public Goods Game Experiments in Thailand: Social Capital and Other Determinants of Contributions

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Abstract

This paper is one of the first papers studying public good game experiments in Thailand. Three experiment games were studied: basic public goods game, public goods game with endowment inequality and finitely repeated public goods game. In all three games, we find that an increase in personal spending decreases public goods contributions. Doing volunteer jobs increases contributions. Except volunteering, other social capital measures such as trust and friendship are not robust in predicting contributions across games. In the game with endowment inequality, subjects with high endowment contribute more than those with low endowment. Moreover, we find that men contribute significantly more than women in the finitely repeated game.

1. Introduction

It has long been established in economics that social cooperation is crucial for escaping bad equilibria and achieving desirable economic outcome and well-being of a country. To study the factors that determine success and failure of cooperation, economists employ public goods experiments. In these experiments, human subjects play a public goods game in a

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laboratory to get monetary payoffs. The total payoffs all subjects get from participating in an experiment depend on how well they cooperate and contribute in public goods. In the past decade, many public goods experiments have been studied using subjects in different countries. These studies show that factors that determine the level of public contributions and cooperation vary across culture and context. However, to our knowledge, there is no study focusing on Thai subjects and environment. In order to fill this gap in literature, we conduct public goods experiments in Thailand and study the determinants of public good contributions.

2. Literature Review

In this section, we first review public goods games and their theoretical outcome. The standard model predicts that there would be zero contribution in equilibrium. After review theory, we review the experimental evidence. The experimental evidence contradicts the standard theoretical prediction. It shows that people contribute significantly. Moreover, the amount of contributions depends on various factors. Therefore, there is still a considerable gap between the standard theory and the experimental evidence.

2.1 Public Goods Game: Theory

2.1.1 Basic Game

The traditional public goods game consists of *N* players. Player i=1, 2, .., *N* has equal initial endowment *E*. Each then simultaneously decides how much to allocate his endowment for private and public goods contributions. Denote p_i and g_i as private and public goods contributions of player *i*, respectively. To satisfy the budget constraint of player *i*, it requires that $p_i + g_i = E$. The utility or payoff of player *i* is $u_i(p_i, G)$ where G is the total amount of public goods provided by the *N* players; $G = \sum_{k=1}^{N} g_k$. The utility function *u* is defined as

$$u_i(p_i, G) = p_i + \gamma G = p_i + \gamma \sum_k g_k = p_i + \gamma g_i + \gamma \sum g_{-i}$$

The term γ is the rate of return of public goods relative to private goods. Typically, the value of γ is between $1/N$ and 1. Player *i*'s maximization problem is

$$\max_{p_i, g_i} u_i(p_i, G) = p_i + \gamma g_i + \gamma \sum_{k \neq i} g_k$$

$$\text{subject to } p_i + g_i = E,\ p_i \geq 0,\ g_i \geq 0$$

With $\gamma < 1$, the dominant strategy for each player is to allocate all his endowment for private goods; $p_i = E$, $g_i = 0$ and $G = 0$. Therefore in the Nash equilibrium, nobody would contribute for public goods and no public goods would be provided and each player's payoff is E.

The Nash equilibrium above is not efficient and there is a classic free rider problem. With $\gamma > 1/N$, the efficient allocation is the one in which every player allocates all endowment for public goods; $p_i = 0$, $g_i = E$ and $G = N \times E$. It follows that the payoff of each player is $\gamma NE > E$.

1.1.2 Repeated Game

If the public goods game above is played repeatedly for a finite number of periods, the only subgame perfect equilibrium is to play the Nash equilibrium of the stage game in every period. Therefore, there would be no public goods provision in every period. However, the outcome would be different if the game is played for infinite periods. As shown in Fudenberg and Maskin (1986), if the discount factor of each player is sufficiently high, there are infinitely many equilibria. In such equilibria, the level of public goods contribution *G* can vary from 0 to *NE*.

1.1.3 Inequality Aversion

Since 1980s, data from experiments has shown that people do contribute significantly in public goods game. The data contradicts the prediction from the standard model. Several alternative theories have been proposal to resolve this inconsistency. A well-known alternative

model is the inequality aversion model.[1] In this model, each agent is not only concerned with his monetary payoff but also the inequality of the whole group. The group size can be as small as two. For an example, in this model, the utility function of player i is

$$u_i = M_i - \Delta_i Q$$

where M_i is the monetary payoff of player i. Δ_i is his inequality aversion parameter. Q is group equality defined as

$$Q = \sum_{j=1}^{n} (M_j - \overline{M})^2$$

where $\overline{M}$ is the average monetary payoff of the group. This inequality aversion model has been shown to predict some cooperative outcome and is more consistent with experimental results.

2.2 Public Goods Game: Experiments

Existing literature shows that contrary to the standard theoretical prediction, experimental evidences show that people do not always free ride and contribute significantly. A goal of experimental research on public goods is to understand factors that determine the size of contributions and improve the the standard theoretical model. The following factors are shown to affect the level of contributions.

Experience and Repetition: The experimental data from Isaac, Walker, and Thomas (1984) and Palfrey and Prisbrey (1993) shows that subjects who have participated in a public goods experiment before contribute less than those who play the game for the first time. An explanation for the larger rate of contribution from inexperienced subject is the following. In early games, inexperienced players do not know the consequence of their choices. A natural choice therefore is somewhere in the middle. More experienced subjects strategically choose low contributions. Similar to experience, many studies for example Isaac, McCue, and Plott (1985), Kim and Walker (1984), Brown-Kruse and Hummels (1992), Banks, Plott, and Porter

[1] For more details on inequality aversion, see Fehr and Schmidt (1999).

(1988) and Andreoni (l988) find that the repetition also decreases the level of contributions. An explanation is the players learn their best response and dominant strategy as the game repeats and in the long run the behavior of players converts to the Nash equilibrium outcome.

Rate of Return: Theoretical prediction shows that the only Nash equilibrium outcome is that no player provides public goods contribution. As shown above, the Nash equilibrium is invariant to the rate of return of public goods (γ). However, experimental research has generally found that the rate of return matters; the higher the rate of return, the higher the contributions. Kim and Walker (1984) increase the rate of return, in the midst of their experiment. The rate was changed from 0.02 to 0.05 to 0.07. Each change is accompanied by a significant increase in contributions. Brown, Kruse and Hummels (1992) have also found a similar relationship.

Communication: Various studies such as Dawes, McTavish, and Shaklee (1977) and Isaac, McCue, and Plott (1985) were able to show that relevant communication increases contributions in experiments. Theoretically, pre-play communication may help players to coordinate and pick a Nash equilibrium among multiple Nash equilibria. However, if there is only one equilibrium, as is true of our public goods game, pre-play communication should not affect the rate of contribution.

Social Capital: Recent economic studies focus more on how social institution affects economic outcome and its policy implication. For example, Knack and Keefer (1997) use cross-country data to show that social capital measured by the World Bank questionnaire and membership in voluntary associations have significant and positive impact on various economic performances. Barro and McCleary (2003) investigate how religious views measured by beliefs in life after death and church attendance using international data. They find that beliefs in life after death significantly affect economic growth. However, the rate of church attendance does not have a significant impact on economic growth.

Anderson, Mellor and Milyo (2004) show that social capital may affect economic performance by increasing cooperation. They find that some social-capital indicators are generally good predictors of the rate of contribution in public goods experiments. However,

some measures of social capital are significant but have an unexpected sign. For example, people who report that they are trustworthy or often loan money to friends tend to contribute less in the public goods game. Anderson and Mellor (forthcoming) study how religious affiliation and participation affect the outcome of public goods game. They find that the rate of contribution to the public goods is not affected by religious affiliation or participation. However, the decrease in group contributions as the game repeats is smaller in religious subjects than those without religious affiliation. This result suggests that religious affiliation may help sustaining cooperation once it occurs.

Gender: Many studies suggest that gender plays an important role in group cooperation. However, the effect of gender differs across studies. Gneezy and Rustichini (2004) find that boys are more competitive than girls. Ortmann and Tichy (1999) find that women are more cooperative than men in the first round of repeated prisoner dilemma experiments. Similary, Eckel and Grossman (1998) shows that women are more charitable than men in a high social distance setting. On the other hand, Cox (2002) reports that men act reciprocally while women do not in an investment game.

3. The Experimental Design

This section discusses the experimental design. Section 2.1 describes the basic stage game. Section 2.2 describes one-shot-game and repeated-game treatments. The last section describes the questionnaire.

3.1 The Basic Stage Game

The basic public goods game employed in the experiment is as follows. Each game has four players. Let i in {1, 2, 3, 4} index each player. Player i receives E_i units of experimental tokens as initial endowment.[2] Then each player simultaneously chooses how

[2] At the end of experiments, each token will be exchanged for real money according to the predetermined exchange rate.

much he would contribute to a public goods project (c_i) and receives his payoff from the stage game. The payoff of player *i* in token unit is determined as follows:.

$$\text{Payoff of player } i = (E_i - c_i) + \frac{1}{2}(c_1 + c_2 + c_3 + c_4)$$

The game is the game discussed in Section 1.1.1 with $\gamma = 0.5$ and $N = 4$.

It is worth discussing the justification for γ=1/2 and group size $N = 4$. The reason we pick γ=1/2 because it is a simple number that is easy to understand for subjects to make calculation for their strategic decision.

It is quite common in the literature to use 4 to 8 persons in a group. One reason is convenience. A larger group size requires larger number of participant of computer lab and is more complicated. For our purpose, we are not interested in how group sizes affect the decision so we pick the group size to be 4. However, if we like to study how group size affects contribution rates, we may consider different group sizes. What the optimal group size is depends on situation we have in mind to apply. For example, if we think about a college student group project. Four is a reasonable number.

The game is implemented by z-Tree[3]. Figures 1 and 2 show samples of computer screen generated by z-Tree. The screen in figure 1 asks the player to choose his contribution. The screen in Figure 2 shows the payoff of the stage game.

[3] z-Tree is a computer software widely used for implanting economics experiment in laboratory. For more information see http://www.iew.uzh.ch/ztree/index.php.

Figure 1

Computer Screen at the Contribution Stage

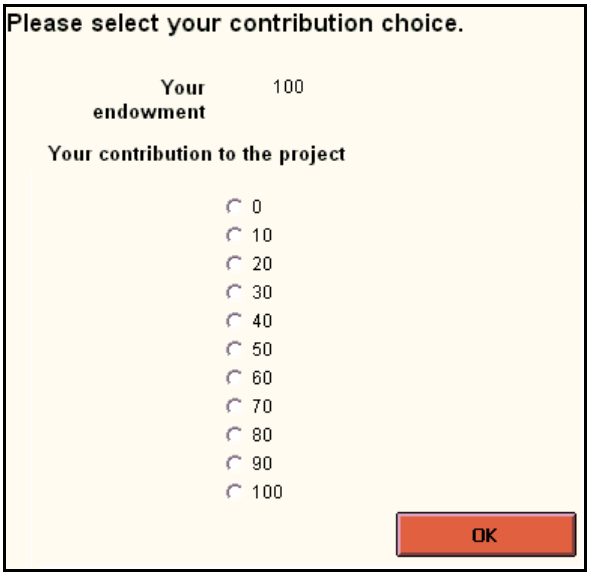
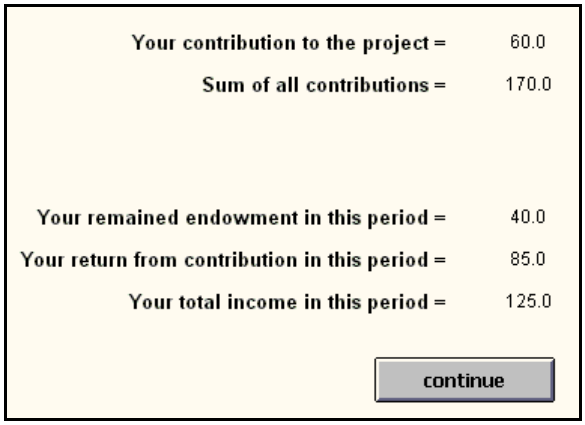


Figure 2

Computer Screen at the Payoff Stage



Our experimental study consists of two treatments as shown in Table 2. The first treatment (one-shot game treatment) consists of three independent one-period public goods

games. The second treatment (repeated treatment) consists of a 7-period repeated public goods game. Each subject is only allowed to participate in one of the two treatments.

3.2 One-shot Game Treatment

The treatment consists of the two following parts:

Part 1: Three basic public goods games. This part has three games in three periods.[4] Before each period starts, players are randomly grouped in groups of four players. With such random grouping, the game in each period can be considered as an independent one-shot game. Each player then plays the basic stage game described in Section 2.1. The initial endowment of each player (E_i) of the each of the four players in each group equals to 100 tokens.

Part 2: The public goods game with endowment inequality. The part has one stage game. The game in this part is similar to that in Part 1 except that players have different initial endowment. Two of the four players in each group have 80-token endowment and the other two have 120-token endowment. Note that the total endowment of each group in the basic game and the game with endowment inequality are the same. The exchange rate of this treatment (Parts 1 and 2) is one token per 0.15 baht.

3.3 Repeated Game Treatment

In this treatment, the game has 7 periods. At the beginning of period 1, before the stage game starts, players are randomly assigned to a group of four players. Different from the one-shot treatment, each player stays in the same group in all 7 periods. The game therefore can be considered as a single 7-period finitely repeated game. In this repeated game, because players in each group are the *same* for all 7 periods, it is more likely for cooperation to emerge than that in the one-shot game. The exchange rate of this treatment is 0.1 baht per token.

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[4] Before the real game starts, each player plays a trial game. The payoff from the trial game and the token players gets from this game has zero values cannot be used to exchanged for real money at the end of the experiment.

Table 2

Summary of the Two Treatments

One-Shot Game Treatment	Repeated Game Treatment
3 basic games + 1 game with endowment inequality	7-period finitely repeated game

3.4 Questionnaire

After each experiment ends, subjects are asked to fill a questionnaire. The questionnaire has 15 questions as shown in Appendix B. The first two questions ask each subject to report his gender and monthly spending on clothes and cosmetics.

The third question asks the subject to evaluate his happiness level. We ask the subject to report his happiness level on scale 1 – 7. This question is adopted from Lyubomirsky and Lepper (1999). Though, there is no economics study reporting the relationship between happiness and public goods contribution. It is well-known in psychology studies that happiness affects cooperation; see Lyubomirsky, King, Diener, E. (2005) for a survey on this issue.

The remaining questions measure religious beliefs and social capital. To measure subjects' attitude on these topics, each subject is asked whether they agree on a statement on each topic on 1-4 scale. A sample question is Box 1:

> "Good things happen to good people." How much do you agree with the previous statement?
>
> 1. disagree 2. slightly disagree 3.slighlty agree 4. agree

Box 1: Sample Question

Table 1

Questionnaire

Questions	Statement	Variable names
4	*You believe in heaven and hell*	Heaven
5	*Good things happen to good people.*	Good thing
6	*By helping others, you help yourself in the long run.*	Help Other
7	*You like to do volunteer job and help other people.*	Volunteer
8	*The city where I live is safe and people are friendly.*	Safe City
9	*People can be trust.*	Trust
10	*Your friends will help you when you need.*	Friend Help
11	*You are happy to lend money to your friends.*	Lend Friend
12	*You are happy to lend money to strangers.*	Lend Stranger
13	*You often give some money to beggars on the street.*	Give Beggar
14	*You are a valuable person of society.*	Valuable Person
15	*You are a good teammate.*	Teammate

The statement for each question is shown in Table 1. Most of the questions are adapted from Glaeser et. al. (2000). It should be noted that we treat the 1-4 scale from the survey as cardinal variable which is a common practice in psychology and experimental economics.

4. Experimental Results

4.1 One-shot Game Treatment

The experiment was conducted in three sessions in last quarter of 2010. There were totally 68 subjects. Of the 68 subjects, 38 are male and 30 are female. All subjects are undergraduate students in the international program in the faculty of economics at Chulalongkorn University. The experiment was done in the computer lab of the faculty. Each

subject played game using one computer.[5] On average each subject spent about 30 minutes and got 105 baht from participating in an experiment session.

4.1.1 The Three Basic Games

We first reports average contributions, payoffs and the standard deviation of contributions of the basic public goods games in period 1 to 3 in Table 3. The average contribution in each period is shown in column 2. There is no obvious time trend in contributions. In the last row of column 2, the average contribution is 46.88 tokens. This result is similar to that found in experimental literature and shows that people are not totally selfish. The average payoff in each period is shown in column 3. As expected, the average payoffs and contributions move in the same direction. The last column shows the standard deviations of contributions. Again, there is no time trend. This result does not support the learning theory in which players' behavior would converge to the Nash equilibrium when players have more experience.

Table 4 shows the average contributions and payoffs of each gender. The last row shows that male and female average contributions are 48.36 and 45.00 tokens, respectively. Although it may seem that men are more cooperative, a formal test rejects the difference in the means of male and female contributions.

Table 3

Contributions and Payoffs of the Three Basic Games

Period	Average Contribution (Tokens)	Average Payoff (Tokens)	S.D.off Contribution (Tokens)
1	48.09	148.09	29.64
2	51.18	153.82	32.99
3	42.79	138.82	32.68
Average 1-3	46.88	148.20	30.98

[5] As a standard protocol for experiment, subjects are separated apart by a partition board. Each subject therefore could not observe the behavior of the other subjects.

Table 4

Contributions and Payoffs by Gender

Period	Average Contribution		Average Payoff	
	Male	Female	Male	Female
1	48.68	47.33	141.32	156.67
2	53.16	48.67	151.05	157.33
3	42.63	43.00	129.47	150.67
Average 1-3	48.36	45.00	142.53	155.38

The correlation coefficients of contributions and their potential determinants in periods 1 to 3 are shown in Table 5. The variables are sorted by their *absolute* correlation coefficients. Only the variables whose correlations are more than 0.05 are shown. The variables most correlates with contributions are spending. Its correlation is -0.20; the higher the subject spends on clothes and cosmetics, the less the subject contributes. Other social capital variables such as Good Thing, Safe City, Volunteer and Lend Stranger have positive correlations with contributions. However, Friend Help negatively correlates with contributions. This result is similar to that in Anderson, Mellor and Milyo (2004). They find that some social capital variables negatively correlate with contributions. In addition to social capital variables, we find that periods negatively correlate with contributions.

Table 5

Correlation Coefficients

Variables	Correlation with Contributions
Spending	-0.20
Good Thing	0.13
Safe City	0.11
Friend Help	-0.10
Period	-0.07
Volunteer	0.06
Lend Stranger	0.06
Valuable Person	0.05

Note: Only variables whose absolute correlation coefficients are more than or equal to 0.05 are shown. The definition of each variable is shown in Section 2.4 and Table 1.

We now report the regression for the determinants of public goods contributions. Because there is no widely accepted economic theory to guide us to pick explanatory variables, we rely our selection on econometrics. Our estimation strategy is as follows. First, we use all variables whose correlations with contributions are higher or equal to 5 per cent as explanatory variables. We then estimate the regression and drop the variable with the highest p-value (least statistically significant). We iterate this process and re-estimate until we obtain the estimation result in which all explanatory variables are significant at the 90-per-cent confidence level. The last estimating equation is reported in Table 6. Surprisingly, only two variables are significant.

Table 6 shows that there are two variables: Spending and Good thing that significantly affect contributions. Personal spending on clothes and cosmetics has negative

impact on contributions. From row 3, column 2, a thousand baht increase in spending would decrease public goods contributions by 3.5 tokens. To our knowledge, there is no report on the direct effect of income or spending on public goods contributions found in literature.[6] A potential explanation for this result is that players who spend more on non-necessary goods such as clothes and cosmetics are more self-concerned. These people therefore contribute less in the public goods game. The positive coefficient in row 3 shows that the more the player believes that good things happen to good people, the more he contributes.

Table 6

Determinants of Public Goods Contributions

Variables	Coefficients
Constant	38.84
	(0.00)
Spending (1000 baht)	-3.52
	(0.00)
Good Thing	20.24
	(0.04)
# of Observation = 204, R-squared = 0.09	

Note: Numbers in parentheses are p-values estimated using White heteroskedasticity robust standard error.

[6] The only effect found in the literature is through the income distribution not through its level.

4.1.2 The Game with Endowment Inequality

This section reports the results of the last game of this treatment in which two of the four players in each group have 80-token endowment and the other two have 120-token endowment. Table 7 shows the average contributions and payoffs. On average, the players with high endowment (120 tokens) contribute 47.34 tokens while the low endowment (80 tokens) players contribute 28.82 tokens. The players with high endowment contribute significantly more. The average contribution of all players in this game is 30.08 while the average contribution in the basic game from Table 3 is 46.88. This result indicates that endowment inequality reduces the average contributions by 36 per cent. It suggests that inequality reduces efficiency. Similar negative effect of inequality to group contributions is reported in Anderson, Mellor and Milyo (2008).

Table 7

Contributions and Payoffs in the Game with Endowment Inequality

Average Contributions			Average Payoffs		
Low Endowment	**High Endownment**	**All**	**Low Endowment**	**High Endownment**	**All**
28.82	47.34	30.08	125.73	150.44	138.01

Similar to Table 5, Table 8 shows the correlation coefficients. The variables with highest correlation coefficients are endowment, Volunteer and Heaven. Table 9 reports the regression result for the determinants of contributions. We employed the same estimation strategy employed above. From Table 9, endowment, volunteering and belief in heaven have significant and positive impacts on contributions. Valuable Person negatively affects contributions. Similar to that in the games without inequality, spending reduces contributions.

Table 8

Correlation Coefficients

Variables	Correlation with Contributions
Endowment	0.32
Volunteer	0.26
Heaven	0.26
Valuable Person	-0.18
Trust	-0.15
Safe Town	-0.13
Friend Help	-0.13
Spending	-0.11
Good Thing	0.11
Happiness	-0.09
Lend Friend	-0.07

Note: The definition of each variable is shown in Section 2.3.

Table 9

Determinants of Public Goods Contributions

Variables	Coefficients
Constant	-24.35
	(0.2)
Endowment	0.48
	(0.01)
Volunteer	9.37
	(0.07)
Heaven	19.12
	(0.09)
Valuable Person	-6.05
	(0.10)
Spending (1000 baht)	-1.96
	(0.10)
# of Obs. = 68, R-squared = 0.27	

Note: See the note below Table 6.

4.2 The 7-period Repeated Game Treatment

Similar to the one-shot treatment, the experiment was conducted at the faculty of economics Chulalongkorn University in the last quarter of 2010. The experiment was conducted in a single session. There were totally 40 subjects; 28 females and 12 males. All subjects are undergraduate students in the international program. On average, a subject spent 30 minutes for the experiment and got 100 baht.

Figure 1 show the average contributions from period 1 to period 7. The top, middle and bottom lines show the average contributions of males, females and all subjects, respectively. Similar to Cox (2002), we find that male contributes significantly higher than females. Different from the one-shot games, gender plays an important role. An interesting dynamics depicted in this graph is that from periods 2 to 7, there is a decreasing trend in contributions. This evidence supports the learning theory.

Figure 1

Contributions in Each Period

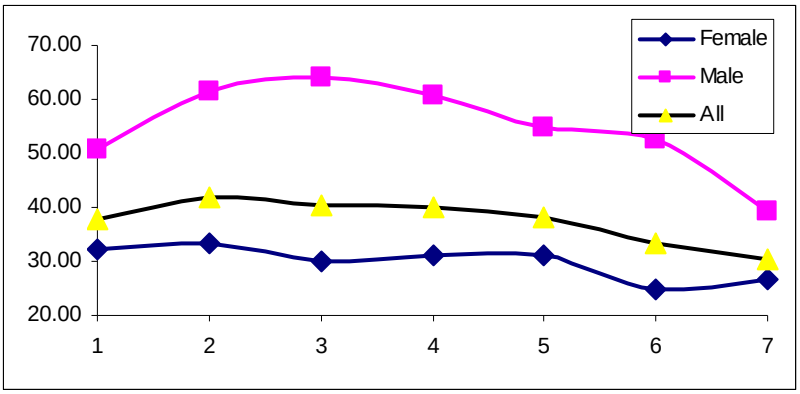

Table 10 shows the variables whose absolute correlation coefficients are more than 10 per cent. Comparing to those in Table 5, the correlation coefficients in Table 10 is much higher. This result indicates that the repeated game is more predictable than the one-shot games. Gender is the variable with the highest correlation. Table 11 shows the contribution

regression. Similar to the one-shot games, Voluteer and Spending have positve and negative effects on contributions, respectively. Males contribute significantly more than females. Periods have a negative coeficient; players contribute less as toward the end of the game. Suprisingly, GiveBeggar and Trust have negative impact on contributions; players who give money to beggars and trust other people tend to contribute less. Similar counterintuitive results are found in Anderson, Mellor and Milyo (2004).

Table 10

Correlation Coefficients

Variable	Correlation with Contributions
Gender	0.45
Give Beggar	-0.38
Volunteer	0.22
Spending	-0.19
Good Thing	-0.19
Lend Friend	-0.13
Trust	-0.13
Period	-0.12
Teammate	0.11
Valuable Person	-0.11
Heaven	-0.10

Table 11

Determinants of Public Goods Contributions

Variable	Coefficient
Constant	26.31 (0.00)
Gender	17.53 (0.00)
Give Beggar	-6.87 (0.00)
Volunteer	13.60 (0.00)
Trust	-4.41 (0.03)
Period	-1.45 (0.07)
Spending (1000 baht)	-1.57 (0.02)
# of Obs = 280, R-squared = 0.24	

Note: See the note below Table 6.

5. Robustness Check on an Alternative Value of γ

As a robustness check for an alternative value of γ, we have an additional small session for the three basic games with $\gamma = 0.7$ in July 2012. There were totally 20 participants (9 males and 11 females). Table 12 shows the average contribution and payoff in each period. From Table 3, the average contribution in periods 1-3 of the basic games with $\gamma = 0.5$ is 46.88. From Table 12, the average contribution of the basic games with $\gamma = 0.7$ is 50.16. Players contributed slightly more with $\gamma = 0.7$. Table 13 shows the regression results for the determinants of public good contributions. We still find that an increase in personal spending has a negative effect on contributions. Moreover, believing that good things happen to good people induces higher public goods contributions. These results are similar to those in the

game with γ=0.5. In conclusion, the only main quantitative difference between the game with γ=0.5 and that with γ=0.7 is that players contribute slightly more in the game with γ=0.7.

Table 12

Contributions and Payoffs of the Three Basic Games

Period	Average Contribution (Tokens)	Average Payoff (Tokens)	S.D. of Contribution (Tokens)
1	48.00	186.40	29.31
2	54.50	198.10	34.54
3	45.79	186.84	32.37
Average 1-3	50.16	190.30	31.19

Table 13

Determinants of Public Goods Contributions

Variables	Coefficients
Constant	33.10 (0.00)
Spending (1000 baht)	-4.68 (0.00)
Good Thing	38.14 (0.10)
# of Observation = 60, R-squared = 0.27	

Note: Numbers in parentheses are p-values estimated using White heteroskedasticity robust standard error.

6. Conclusion

Conducting economic experiments in Thailand, we study basic public goods games, public goods games with endowment inequality and finitely repeated public goods games. Similar to existing literature, we find that the experimental results contrast to the standard theoretical prediction. Players are not totally selfish but are concerned with others' wellbeing. They are cooperative in a certain degree. The two variables that are most robust in explaining contributions in most of the games are spending and volunteering. Players who do some volunteer jobs contribute more, while an increase in personal spending on clothes and cosmetics reduce contributions. An explanation for the result on spending is that people who spend more are more self-concerned and less concerned on public utility. These people therefore contribute less. Except volunteering other social capital variables are not very robust in predicting the contributions in across games. This result suggests that a public campaign for volunteering can be an effective way to promote social cooperation.

In the games with endowment inequality, initial endowment affects contributions greatly. Players with high endowment contribute more than those with low endowment. Moreover, we find that inequality reduces the total contribution and also efficiency. This result might be relevant in explaining current political conflicts in Thailand.

In the finitely repeated game, we find that gender plays a significant role; men are more cooperative than women. In addition, players contribute less near toward game. This result supports the learning theory.

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Appendix A

Instruction for One-shot Public goods Game Treatment

You are now taking part in an economic experiment on individual decision making. If you read the following instructions carefully, you can, depending on your decisions, earn a considerable amount of money. It is therefore very important that you read these instructions with care.

Because this experiment wants to study *individual* decision making**, it is prohibited to communicate with the other participants during the experiment. It is also prohibited to use your computer for other purpose except for the experiment.** If you have any questions, please ask us. If you violate this rule, you will be dismissed from the experiment and forfeit all payments.

During the experiment we will not speak in terms of Baht, but in tokens. During the experiment your entire earnings will be calculated in tokens. At the end of the experiment the total amount of tokens you have earned will be converted to Baht at the following rate:

1 Token = 0.18 Baht

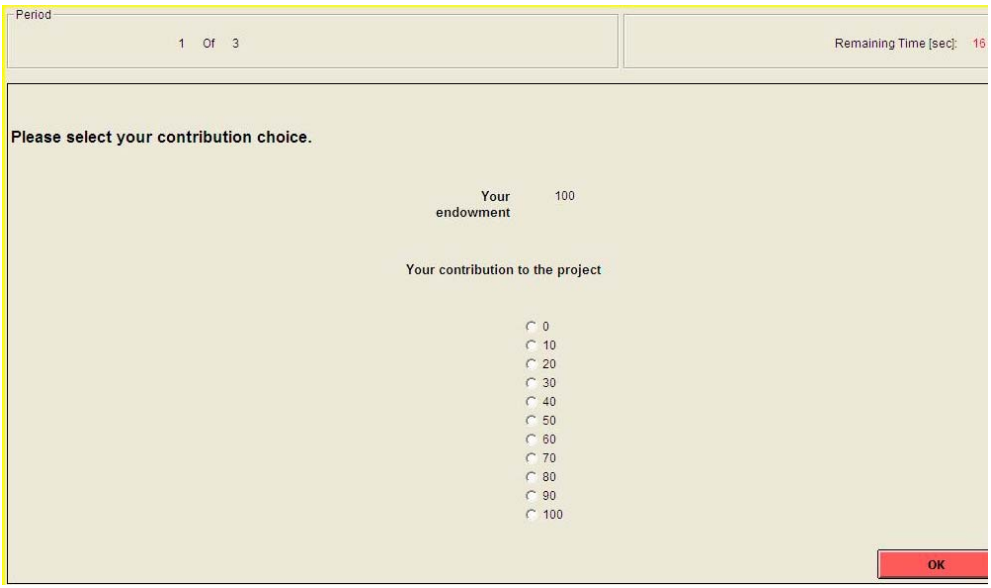
The experiment has 2 separated stages as follows.

Stage 1: The public goods game #1

This stage consists of one trial period plus 3 non-trial periods. As the experiment begins, the trial period comes first. In each period the participants are grouped into groups of four. You will therefore be in a group with 3 other participants. **The composition of the groups will be changed every period.** In the following pages we describe the experiment in detail.

At the beginning of each period each participant receives **100 tokens**. We call this his or her endowment. Your task is to decide how to use your **endowment**. You have to decide how many of the 100 tokens to **contribute to a group project** and how many of them to keep

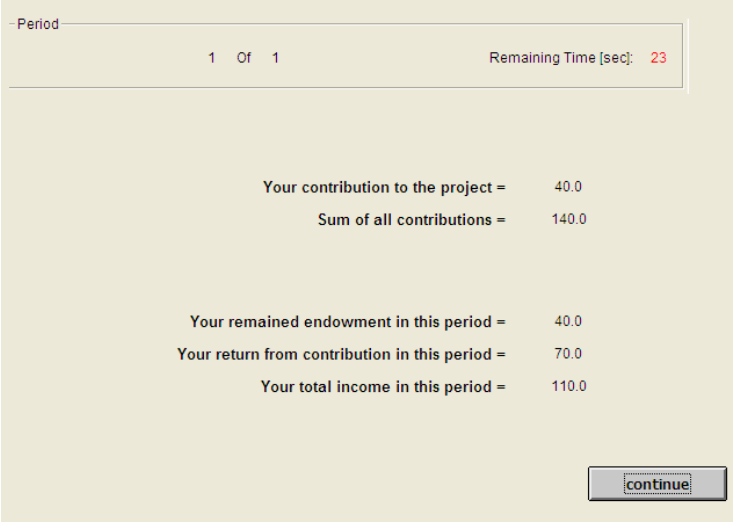
for yourself. The consequences of your decision are explained in detail below. At the beginning of each period the following input-screen for the first stage will appear:



The period number appears in the top left corner of the screen. In the top right corner you can see how many **seconds** remain for you to decide on your contribution. You will have 30 seconds. Your decision must be made within the time limit.

Your **endowment in each period is 100 tokens**. You have to decide how many tokens you want to contribute to the group project. As soon as you have decided how many tokens to contribute to the project, you have automatically decided how many tokens you keep for yourself; that is (**100 – your contribution**) tokens. After choosing your contribution you must click the O.K. button.

After all members of your group have made their decision the following screen will show you the total amount of tokens contributed by all four group members to the project (including your contribution). The following screen will show how many tokens you have earned at this period.



Your **income** consists of two parts:

(1) The tokens which you have kept for yourself ("remained endowment")

(2) The "return from contribution to the project". This income is calculated as follows:

Your return from the project = **0.5 *times* the total contributions (from the whole group) to the project.**

Your **income in tokens** of a period is therefore:

(100 – your contribution to the project) + 0.5*(total contributions to the project)

The income of each group member is calculated in the same way.

For each token, which you keep for yourself you earn an income of 1 token. Suppose you contributed this token to the project instead, then the total contribution to the project would rise by one token. Your income from the project would rise by 0.5*1=0.5 tokens. However the income of the other group members would also rise by 0.5 tokens each, so that the total income of the group from the project would rise by 2 tokens.

In the first two periods you have 45 seconds and in the remaining periods 30 seconds to view this income screen. If you are finished before the time is up, please click the "continue"-button.

The overall income in the first stage is the accumulation of all three periods' income. **Note that income from the trial period will not be included.** The results from the trial period do not have any effect.

After all participants have finished the third periods, the experiments will continue to the second stage.

Stage 2: The public goods game #2

This stage contains only one period, which is very similar to the first stage. Again, the participants are divided into groups of four. However, the difference is that – **participants now have different amount of endowment.** Two of the participants in each group have **120 tokens** as their endowments. The other two, on the other hand, have only **80 tokens**. You are notified the amount of your endowment though the input-screen.

Again, you are asked to contribute to the project. You have to decide how many tokens you want to contribute to the project. **You can choose 0 to 120 if you have endowment of 120 tokens. You can choose 0 to 80 if you have endowment of 80 tokens.** Your income from project is calculated as 0.5 times the total contributions to the project, which is the same as the first stage.

Thus, your overall income in this stage is calculated as follow.

If you have endowment of 120 tokens **Your income = (120 – your contribution to the project) +** **0.5*(total contributions to the project)**

Your overall income from the experiment comes from the accumulation of all three stages. Then, your income in tokens is converted to Baht by the rate of 1 Token = 0.18*Baht.

After the experiments end, you will be asked to complete the questionnaire. Again, **it is prohibited to communicate with the other participants during the experiment.** After the experiment is done, please remain seated to receive your money from the experiment.

If you have any questions, please ask us. Do you have any questions?

Appendix B

Questionnaire

Please answer the following questions as best as you can. The answers will be kept secret and be used only for academic research purpose only.

1. Gender ____Male ____ Female
2. On average, your personal spending on clothes and cosmetic in each month is _____ baht
3. Pick the choice that shows your happiness level in your life in general.
   1. very unhappy 2. unhappy 3. slightly unhappy 4. moderate 5. slightly happy 6. happy 7. very happy
4. "You believe in heaven and hell" How much do you agree with the previous statement?
   1. disagree 2. slightly disagree 3.slighlty agree 4. agree
5. "Good things happen to good people." How much do you agree with the previous statement?
   1. disagree 2. slightly disagree 3.slighlty agree 4. agree
6. "By helping others, you help yourself in the long run." How much do you agree with the previous statement?
   1. disagree 2. slightly disagree 3.slighlty agree 4. agree
7. "You like to do volunteer job and help other people." How much do you agree with the previous statement?
   1. disagree 2. slightly disagree 3.slighlty agree 4. agree
8. "The city where I live is safe and people are friendly." How much do you agree with the previous statement?
   1. disagree 2. slightly disagree 3.slighlty agree 4. agree

9. “People can be trust.” How much do you agree with the previous statement?
    1. disagree 2. slightly disagree 3.slighlty agree 4. agree
10. “Your friends will help you when you need.” How much do you agree with the previous statement?
    1. disagree 2. slightly disagree 3.slighlty agree 4. agree
11. “You are happy to lend money to your friends” How much do you agree with the previous statement?
    1. disagree 2. slightly disagree 3.slighlty agree 4. agree
12. “You are happy to lend money to strangers” How much do you agree with the previous statement?
    1. disagree 2. slightly disagree 3.slighlty agree 4. agree
13. “You often give some money to beggars on the street.” How much do you agree with the previous statement?
    1. disagree 2. slightly disagree 3.slighlty agree 4. agree
14. “You are a valuable person of society.” How much do you agree with the previous statement?
    1. disagree 2. slightly disagree 3.slighlty agree 4. agree
15. “You are a good teammate.” How much do you agree with the previous statement?
    1. disagree 2. slightly disagree 3.slighlty agree 4. agree