

DISCUSSION PAPER SERIES

IZA DP No. 12919

**The Effect of Financial Constraints on  
In-Group Bias: Evidence from  
Rice Farmers in Thailand**

Suparee Boonmanunt  
Stephan Meier

JANUARY 2020

## DISCUSSION PAPER SERIES

IZA DP No. 12919

# The Effect of Financial Constraints on In-Group Bias: Evidence from Rice Farmers in Thailand

**Suparee Boonmanunt**

*Mahidol University*

**Stephan Meier**

*Columbia Business School and IZA*

JANUARY 2020

Any opinions expressed in this paper are those of the author(s) and not those of IZA. Research published in this series may include views on policy, but IZA takes no institutional policy positions. The IZA research network is committed to the IZA Guiding Principles of Research Integrity.

The IZA Institute of Labor Economics is an independent economic research institute that conducts research in labor economics and offers evidence-based policy advice on labor market issues. Supported by the Deutsche Post Foundation, IZA runs the world's largest network of economists, whose research aims to provide answers to the global labor market challenges of our time. Our key objective is to build bridges between academic research, policymakers and society.

IZA Discussion Papers often represent preliminary work and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. A revised version may be available directly from the author.

ISSN: 2365-9793

**IZA – Institute of Labor Economics**

Schaumburg-Lippe-Straße 5–9  
53113 Bonn, Germany

Phone: +49-228-3894-0  
Email: [publications@iza.org](mailto:publications@iza.org)

[www.iza.org](http://www.iza.org)

## ABSTRACT

---

# The Effect of Financial Constraints on In-Group Bias: Evidence from Rice Farmers in Thailand

In-group bias can be detrimental for communities and economic development. We study the causal effect of financial constraints on in-group bias in prosocial behaviors – cooperation, norm enforcement, and sharing – among low-income rice farmers in rural Thailand, who cultivate and harvest rice once a year. We use a between-subjects design – randomly assigning participants to experiments either before harvest (more financially constrained) or after harvest. Farmers interacted with either in-group or out-group partners at village level. We find that in-group bias in cooperation and norm enforcement exist only after harvest, that is, when people are less financially constrained.

**JEL Classification:** C93, D64, D91

**Keywords:** cooperation, financial constraints, in-group bias, lab-in-the-field experiment, norm enforcement

**Corresponding author:**

Stephan Meier  
Columbia Business School  
3022 Broadway  
New York, NY 10027  
USA

E-mail: [sm3087@gsb.columbia.edu](mailto:sm3087@gsb.columbia.edu)

# 1 Introduction

It is commonly known and supported by evidence that cooperation and norm enforcement are critically important for the functioning of society (Fehr and Fischbacher 2004; Fehr and Gächter 2000; Fehr et al. 2002; Gintis et al. 2008). Specifically, studies show that cooperation and norm enforcement are related to the success of groups in managing common-pool resources and other community projects (Kosfeld and Rustagi 2015; Ostrom 1990; Rustagi et al. 2010). Critically important for prosperity is the ability to avoid parochialism—that is, in-group bias—in cooperation and norm enforcement (e.g. Bowles et al. 2003, Choi and Bowles 2007, Gneezy and Fessler 2012). Outright ethnic conflicts are devastating to economic development (Ray and Esteban 2017).

While there is much evidence showing that (non-parochial) cooperation and norm enforcement are positive for communities and economic development, there is little causal evidence of whether the financial situation affects parochial prosocial behavior.<sup>1</sup> This paper provides evidence on how financial constraints affect parochial cooperation, norm enforcement and sharing.

There is a longer debate and literature on the relationship between financial situation and prosocial behavior. Previous correlational evidence is, however, mixed. Some studies find that poverty tends to make people less altruistic (Fisman et al. 2015), less trusting (Glaeser et al. 2000; Jiang and Lim 2018), more corrupt (Olken and Pande 2012) and more individualistic (Bianchi 2016). Others find that poorer individuals are more helping and trusting (Piff et al. 2010) and less likely to cheat (Piff et al. 2012). Only limited works investigate the casual effect of poverty or scarcity on prosocial behavior, and they also find mixed results. Some studies find no effect of scarcity on sharing (Bartos 2016), cooperating (Prediger et al. 2013) or cheating (Aksoy and Palma 2019; Boonmanunt et al. 2019), and no effect of poverty on social preferences (Andreoni et al. 2017). Others, however, find that scarcity leads to more antisocial behavior (Prediger et al. 2014) and less enforcement of the sharing norm (Bartos 2016).

Recent evidence suggests that poverty directly affects economic preferences such as time and risk preferences (Haushofer and Fehr 2014), and even cognitive functioning (Mani et al. 2013) and values (Shah et al. 2015). Although the evidence is mixed on whether intuitive decision-

---

<sup>1</sup> In this paper, we use the terms parochialism and in-group bias interchangeably.

making affects prosocial behavior (Kessler & Meier 2014; Rand 2016 for the meta-analysis on this topic; Rand et al. 2012; Schulz et al. 2014; Tinghög et al. 2013), financial constraints could affect prosocial behavior through their influence on cognitive functioning. A number of papers on scarcity, defined as having less of something than is needed, argue that scarcity limits people's attention to the domain in question and makes people neglect other domains (Shah et al. 2012; Mullainathan and Shafir 2013, Boonmanunt et al. 2019). In this respect, people might think of others less when more financially constrained and be less willing to cooperate and enforce the cooperative norm.

In addition, previous studies show that group membership causes in-group bias (see Akerlof and Kranton 2000, 2005, for the seminal papers in economics following a long tradition in social psychology), and especially increases prosocial behavior towards group members (e.g. Charness et al. 2007; Chen and Li 2009; Chen and Chen 2011; Goette et al. 2006). This can be rooted in the culture-gene coevolution, which explains how human behavior is a product of both genetic selection and socially learned behavior (culture). The coevolution theory predicts in-group bias because the altruistic cooperation and altruistic punishment of defectors can enhance groups' survival chances when groups experience any shocks (Henrich 2004; Chudek and Henrich 2011). In addition, previous studies show that certain environments can influence in-group bias, such as competition for scarce resources (Goette et al. 2012) or a culture of crime in a specific neighborhood (Meier et al. 2016). Further evidence shows that negative events related to survival increase prosocial behavior (Cassar et al. 2017 on a tsunami in Thailand; Rao et al. 2011 on an earthquake in China), especially towards in-group members (Bauer et al. 2016 on wars). In sum, scarcity might drive higher parochial norms and preferences for potential success in intergroup competition to enhance group survival chance. We investigate on a more fundamental level whether poverty as a potential environment can shape parochial cooperation and norm enforcement.

To offer causal evidence, we conducted one-shot, lab-in-the-field experiments with low-income rice farmers in Thailand who cultivate and harvest rice only *once* a year. The experiments were randomly conducted before and after rice harvest with different but comparable groups of farmers in 24 villages. Between the two periods, our participants' financial situations differ significantly. This allows us to study the effect of financial constraints on social behavior (see Aksoy and Palma 2019; Bartos 2016; Boonmanunt et al. 2019; Carvalho et al. 2016; Mani et al.

2013 for a similar approaches). We conducted a prisoner's dilemma, a prisoner's dilemma with third-party punishment, and a dictator game to measure cooperation, norm enforcement and sharing behavior, respectively. The behavior in the dictator game is to control for the willingness to share on revealed cooperative behavior (Ashraf et al. 2006). In both before- and after-harvest sessions, half our participants interacted with partners from their own village (in-group), and the other half interacted with partners from another village (out-group).

The results show that sharing preferences measured as giving in the dictator game are parochial: participants shared more with an in-group partner than with an out-group partner. These sharing preferences are stable across harvest timing; that is, they are not affected by people's financial resources. However, in-group bias in cooperation and norm enforcement exist only after harvest, when participants are less financially constrained. Before harvest, cooperation and norm enforcement are not significantly different between in- and out-group treatments. After harvest, participants are more likely to cooperate when the partner is an in-group person than when the partner is an out-group person. After harvest, participants also enforce more cooperative norms by punishing an out-group person more than an in-group person.

Our paper contributes to a number of different literatures. First, it contributes to the debate on the relationship between financial situation and prosocial behavior. Our results indicate that financial constraints lead to differences in cooperation and norm enforcement but only *parochially*. To our knowledge, we are the first to examine the *casual effect* of (seasonal) financial constraints on *parochial* cooperation and (cooperative) norm enforcement.

Second, this paper contributes to the literature on parochialism. While there is much correlational work in psychology showing that wealth is correlated with individualism (Bianchi 2016, Hofstede 2001, Inglehart 1997), no study that we are aware of explores the causal effect of financial constraints on parochial cooperation and norm enforcement. The only exception is the concurrently and independently conducted study by Aksoy and Palma (2019). They investigate how scarcity affects cheating and sharing behavior towards an in-group and an out-group person with coffee farmers in Guatemala. They find that subjects exhibit in-group bias in cheating and sharing in an abundance period, that is, during harvesting months, whereas there is no such bias when subjects face stronger financial constraints in a scarcity period, that is, during non-harvesting months. Their result resonates with our results from another part of the world in cooperation and

norm enforcement that in-group bias is dampened under financial constraints. Our study, however, focuses on cooperation and, importantly, norm enforcement.

The paper is structured as follows. In section 2, we describe our setting and experimental design. Section 3 reports the experimental results. Section 4 concludes.

## 2 Setting and Design

### 2.1 Participants and Experimental Sessions

Our participants were 568 low-income rice farmers from 48 villages in the rural area of Ubon Ratchathani, in northeastern Thailand. They cultivate and harvest rice *only once* a year. Rice is the main source of nutrition in Thailand (see, e.g., Kawasaki 2010). Therefore, farmers first use the rice harvest for subsistence consumption, which allows them to save possible high expenditures on rice and which alone can relax financial constraints after rice harvest. In addition, for most farmers the rice harvest can also generate a substantial income (for 65% of all participants in the year we conducted the experiment). In general, farmers have several sources of income, such as growing rice, cassava, corn, vegetables, and performing wage work. However, they are considered a low-income population; for example, 93% of our participants are eligible for a monthly government transfer for grocery expenses. Around 92% of all participants consider rice farming to be their main occupation, in some cases even if they did not earn from a rice harvest in 2017, the year in which our experiment was conducted.

Farmers begin preparing their land for rice cultivation at the beginning of the rainy season, in May. Between May and November, farmers invest substantial amounts in rice farming (18% of total annual expenditures). By the end of November or beginning of December, rice can be harvested if there is no natural disaster like flooding or drought or other disasters like pests or severe insect invasion. In our case, farmers began cultivating the land in May 2017 and harvested at the end of November with no disaster. This setting enables us to investigate the *casual effect* of financial constraints on any decision-making and behavior (similar to Aksoy and Palma 2019; Boonmanunt et al. 2019; Carvalho et al. 2016; Mani et al. 2013).

We conducted a lab-in-the-field experiment in each of all 48 villages. We used a between-subjects experimental design with 283 farmers from 24 villages before harvest (during the period 25–30 September 2017) and 285 farmers from another 24 villages after harvest (during the period

8–14 December 2017). The villages are located in the same three sub-districts. We assigned the villages randomly (but stratified on the sub-district level) into before- or after-harvest sessions. In each village we recruited 12 villagers to participate in the experiments in one session through brochures. Interested farmers had to register for the experiment with a community leader suggested by the Community Development Department. Where more than 12 farmers registered, we randomly chose 12 who were eligible to participate in this study (see more details about the sessions, the recruitment and the map of the locations in Appendix B).

Our participants in the before- and after-harvest sessions did not differ in their socio-demographic characteristics in terms of age, gender, education, number of children, whether they are in debt or whether rice farming is their main occupation (see Table 1 and more detail in Appendix A). The similar high fractions of participants who are in debt in both the before- and the after-harvest groups show that most of our participants are in debt year-round, indicating their low-income status.

Table 1: Socio-demographic characteristics of participants

<b>Characteristics (Average)</b>	<b>Before harvest</b>	<b>After harvest</b>	<b>p-value</b>
Age (years)	49.28 [11.26]	50.4 [9.89]	0.22
Female (%)	70.97[0.45]	73.57 [0.44]	0.51
Education (years in school)	6.56 [2.95]	6.27 [2.85]	0.23
No. of children	2.47 [1.36]	2.45 [1.11]	0.73
In debt (%)	90.32 [0.30]	89.29 [0.31]	0.78
Rice as main occupation (%)	90.68 [0.29]	92.86 [0.26]	0.36

*Note:* Wilcoxon rank-sum test is performed for continuous variables, and Fisher’s exact test for dummy variables. Standard deviations are in brackets.

## 2.2 In- and out-group design

We induced in-group and out-group membership at the village level. In other words, in-group members for any participant are other participants living in the same village, and out-group members live in another village. Again, for this dimension, we used a between-subjects design with 279 farmers interacting with an in-group person and 280 farmers with an out-group person. Table 2 shows the number of participants in each treatment of our 2×2 experimental design

regarding the timing—before or after harvest—and interaction with either an in-group or an out-group person.

Table 2: Number of participants in each treatment

2×2 Design	Before harvest	After harvest
In-group	n = 140	n = 139
Out-group	n = 139	n = 141

We used the Inclusion of Other in the Self scale (Aron et al. 1992) to determine the closeness of the relationship between each participant and people from the same village (in-group) and people from another village (out-group) [see items 3 and 4 in the post-experiment questionnaire in Appendix D]. The scale ranges from 1 (not close at all) to 7 (very close). Our data suggest that participants felt significantly closer to an in-group person than to an out-group person [mean for an in-group member is 6.35 and for an out-group is 4.55; Wilcoxon signed-rank test,  $p < 0.001$ ]. This is valid for both the before- and the after-harvest groups, as shown in Table 3. This means that our manipulation on group membership worked well.

Table 3: Inclusion of Other in the Self scale regarding the harvest timing and ingroup bias

Inclusion of Other in the Self scale (IOS scale)	Before-harvest	After-harvest	Overall
For people from the same village (in-group)	6.25	6.44	6.35
For people from another village (out-group)	4.33	4.78	4.55
p-value	<0.001	<0.001	<0.001

*Note:* Wilcoxon signed-rank test is performed.

### 2.3 Before-/after-harvest differences in financial situations

This section shows that farmers in the before- and after-harvest groups indeed differ significantly in their financial situations. We collected self-reported data on financial situations with the post-experiment questionnaire in the following aspects: household monthly income and monthly expenditure for the whole year (separated for each month), amount of debt and whether farmers have savings of any kind (e.g. savings in a bank, gold, or livestock) at the time of the interview. Table 4 presents OLS and median regressions, where a measure of current financial situation—either household income and expenditures, amount of household debt, or whether a

participant has some savings—is regressed on an indicator variable for being randomly assigned to the after-harvest group, household size (except for the “individual savings” dummy) and a constant. The coefficient on the constant gives the mean or median for the before-harvest group.

Table 4: Before-/after-harvest differences in financial situation

	HH Income	HH Expenditures	Amount of HH Debt	Savings (dummy)	Financial Satisfaction
<b>OLS</b>					
{After-harvest}	฿31,241 [3,647]***	฿7,111 [1,003]***	-฿52,698 [16,711]***	0.19 [0.03]***	0.25 [0.19]
No. of HH members	฿4,111 [1,192]***	฿1,762 [431]***	฿13,022 [4,230]***	-	-
Constant	-฿7,296 [5,454]	฿3,196 [1,743]*	฿132,436 [22,987]***	0.76 [0.03]***	7.08 [0.12]***
<b>Median regression</b>					
{After-harvest}	฿14,000 [1,755]***	฿5,407 [737]***	-฿33,333 [14,258]**	-	1.00 [0.27]***
No. of HH members	฿1,400 [470]***	฿1,072 [197]***	฿13,333 [3,816]***	-	-
Constant	฿1,800 [2,484]	฿4,213 [1,044]***	฿50,000 [20,182]**	-	7.00 [0.19]***
<b>p-value Wilcoxon rank-sum test for equality of distribution</b>					
	<0.001	<0.001	<0.01	<0.001	0.06
Observations	559	559	559	559	559

*Notes:* This table reports results from OLS and quantile regressions (quantile 0.5) of the dependent variables shown in the column headings on an indicator variable identifying participants assigned to the after-harvest groups and a constant controlling for household size when variables are at the household level (the first three variables). Household expenditures include expenditures for agricultural activities. Financial satisfaction was elicited by the question “How satisfied are you with the financial situation of your household?” on 1–10 scale; 1 means very unsatisfied, 10 means very satisfied. Robust standard errors are in brackets. The last panel shows the p-value of a Wilcoxon rank-sum test. A similar table also appears in Boonmanunt et al. (2019), which is under the same larger project. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01.

The results in Table 4 indicate that the after-harvest group was less financially constrained than the before-harvest group: the after-harvest group’s mean household income is 73% higher than the before-harvest group’s [mean income after harvest is 42,442 Baht (1,286 USD, equivalent

to the purchasing power of 3,406 USD)<sup>2</sup> and mean income before harvest is 11,533 Baht (349 USD or 926 USD PPP); Wilcoxon rank-sum test,  $p < 0.001$ ]. Although the fraction of households in debt in both groups is very similar—around 90%, as shown in Table 1—mean household debt before harvest is 39% higher than that after harvest [192,086 Baht (5821 USD or 15,416 USD PPP) and 138,338 Baht (4,192 USD or 11,103 USD PPP); Wilcoxon rank-sum test,  $p < 0.01$ ]. The after-harvest group is on average more likely to have individual savings of any kind (such as bank savings and livestock) than the before-harvest group (95% and 76%; Wilcoxon rank-sum test,  $p < 0.001$ ).

In addition, to the question “How satisfied are you with the financial situation of your household?” on a 1-to-10 scale (1 = very unsatisfied; 10 = very satisfied), the after-harvest group tends to respond more positively than the before-harvest group. However, the two groups do not differ in overall life satisfaction, as indicated by the subjective well-being question taken from the World Value Survey, which also uses a 1-to-10 scale (Wilcoxon rank-sum test,  $p = 0.46$ ).

## 2.4 Experimental design

We used three types of experimental games to investigate the effects of financial constraints and in-group bias on cooperation, norm enforcement and sharing. The order of these games was the same for all participants in all 48 sessions. We used a complete stranger design, meaning that participants always interacted with different random people in different games. Payment was accumulated from all games. Feedback about experimental earnings from each game was not provided during the experiment but only after all games and the post-experiment questionnaire were conducted. See details about the procedures and pilots in the Appendix.

**Prisoner’s dilemma:** Participants played a simultaneous one-shot prisoner’s dilemma game with either an in-group or an out-group partner. Group affiliation was clearly marked in black (for an in-group) or white (for an out-group) on the decision sheets (see instructions and answer sheets in SI). Both players were endowed with 40 Thai Baht (3.21 USD PPP) and could choose between keeping the endowment (defect) or passing it to an anonymous partner (cooperate). Passed endowment was doubled along the way. Thus, if both players passed the endowment on, they each got 80 Baht (6.42 USD PPP). However, a purely self-interested player

---

<sup>2</sup> The exchange rate of 1 USD was 33 Thai Baht on experimental days. However, the purchasing power parity (PPP) conversion factor (GDP) was 12.46 Thai Baht per 1 USD in 2017 (World Bank 2019).

could be better off by keeping their endowment regardless of what their partner decided: keeping the endowment when the partner also kept theirs would yield 40 Baht, whereas passing it on would yield nothing; keeping the endowment when the partner sent theirs would yield the maximum amount of 120 Baht (9.63 USD PPP). Cooperation therefore reflects non-selfish motives (Goette et al. 2006; Goette et al. 2012; Meier et al. 2016).

**Prisoner’s dilemma with third-party punishment:** There were two stages with two additional people involved. In the first stage, half the participants were player A1 and A2 (called No-Hat 1 and No-Hat 2 in the game setup and instructions) and played a simultaneous prisoner’s dilemma as in the previous prisoner’s dilemma. In the second stage, the other half of the participants were player B1 and B2 (called Hat 1 and Hat 2 in the game setup and instructions) and received an endowment of 140 Baht (11.24 USD PPP), while A-players received an additional 20 Baht (1.61 USD PPP). The B-players could pay up to 20 Baht (1.61 USD PPP) in increments of 2 Baht (0.16 USD PPP) to deduct the payoff of a randomly assigned A-player, up to 60 Baht (4.82 USD PPP). Each 1-Baht deduction reduced the assigned A-player’s endowment by 3 Baht (0.24 USD PPP). The B-players decided for all four possible scenarios in the prisoner’s dilemma (in the first stage) how much the assigned A-player should be punished (the so-called *strategy method*). Thus, this experiment examines the norm enforcement of cooperative behavior or antisocial punishment (Goette et al. 2006; Goette et al. 2012; Meier et al. 2016).

To examine the impact of financial constraints on in-group bias in norm enforcement, we varied the composition of players in a between-subjects design as shown in Figure 1 and refer to it from player B1’s perspective. Thus, the A-player who is subject to punishment by B-player is A1, and A2 refers to the other A-player. Black players are those from the same village (in-group), and white players are from another village (out-group).

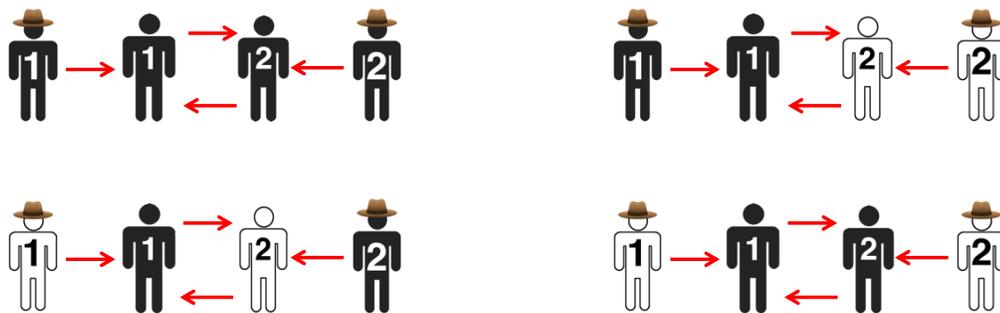


Figure 1: Group compositions in a prisoner’s dilemma with third-party punishment

**Dictator game:** Participants were randomly paired with a new in-group or out-group partner. Each pair consisted of a sender and a receiver. A sender was endowed with 100 Baht (8.03 USD PPP) and had to decide how much to send to the receiver (0–100) and kept the rest. All participants were asked to decide as a sender and were informed that after the experiment half of them would be randomly assigned to be senders. This game therefore examines the sharing preferences of the participants. Sharing behavior is used to control for willingness to share based on revealed cooperative and norm enforcement behavior.

**Payment:** The whole experimental session took 74 minutes on average.<sup>3</sup> The post-experiment questionnaire interview took about 20 minutes for each participant. The average experimental earnings accumulated from all games was 279 Baht (22.39 USD PPP). The show-up fee was 100 Baht (8.03 USD PPP). After the experiment, additional payment for answering the questionnaire of 100 Baht was announced so that it would not affect the farmers' game decisions. All earnings were paid in cash after each experimental session. Note that the minimum daily wage in Thailand is 300 Baht.

### 3 Results

We present the results in three steps: first, we analyze the sharing behavior of individuals. Second, we focus on parochial cooperation behavior before and after the harvest; and third, we analyze parochial punishment behavior.

#### 3.1 Before-/after-harvest indifference in sharing

This section shows how farmers in the before- and the after-harvest sessions share an endowment with a random partner from their own village (in-group) or from another village (out-group), ranging from 0 to 100 Baht (8.03 USD PPP). Overall, farmers do not share differently before and after harvest [means are 35.21 Baht vs 34.59 Baht; Wilcoxon rank-sum test,  $p = 0.73$ ].

Before-harvest farmers share weakly significantly more with an in-group partner than with an out-group partner [means are 37.34 Baht for in-group vs. 33.06 Baht for out-group; Wilcoxon rank-sum test,  $p = 0.03$ ], and after harvest as well [means are 36.76 Baht for in-group vs. 32.45 Baht for out-group; Wilcoxon rank-sum test,  $p = 0.03$ ]. This indicates that farmers tend to have in-

---

<sup>3</sup> This project is a part of a larger study, which consists of four games. After the three games in this paper and before the post-experiment questionnaire, a cheating game was conducted. The results are reported in Boonmanunt et al. (2019). The game order remained the same for all participants, and no feedback was given during the experiment.

group bias in sharing both before and after harvest. The OLS regressions of sharing amounts in the dictator game on in-group status of the partner, separated for harvest timing, show weakly significant coefficients of the in-group status of the partner also when we control for demographic characteristics like age, gender, education, whether a participant is in debt, and whether a participant sold rice and therefore generated income from the rice harvest in 2017 (see Models II and IV in Table 5).

All in all, farmers show stable sharing preferences. This finding is in line with Bartos (2016), who conducted a dictator game with (only in-group) farmers in Afghanistan before and after harvest. However, this finding is not completely in line with Aksoy and Palma (2019), who find that coffee farmers in Guatemala show in-group bias in sharing in abundant (harvesting) periods but that this bias fades in scarcity (non-harvesting) periods.

*Result 1: Farmers have stable sharing preferences over harvest timing towards both an in-group and an out-group person.*

### **3.2 In-group bias in cooperation**

This section shows how cooperative farmers are towards a random in-group or out-group partner before and after rice harvest. Figure 2 summarizes that before harvest, cooperation rates with an out-group or an in-group partner are not statistically different (means are 0.39 for out-group vs. 0.47 for in-group; Fisher's exact test,  $p = 0.18$ ). After harvest, the cooperation rate with an out-group is significantly lower than with an in-group (means are 0.38 for out-group vs. 0.52 for in-group; Fisher's exact test,  $p = 0.02$ ).

These findings are robust in logit regressions of cooperation (dummy) on in-group status, and also when we control for demographic and other characteristics, sharing preference (measured in our dictator game), and trust and risk levels (see Models V–VIII in Table 5). We elicited trust and risk levels using survey questions designed by Falk et al. (2018). Trust level ranges from 0 to 10 for the question “Do you think that other people only have the best intentions?” Risk level ranges from 0 to 10 for the question “Are you a person who is generally willing to take risks, or do you try to avoid taking risks?” The coefficients of trust and risk levels are rather small and not statistically significant. Trust and risk levels are additional controls in the regressions of

cooperation but not in the regressions of sharing or norm enforcement because trust and risk preferences likely influence the propensity to cooperate but not to share or to enforce the norm.

*Result 2: Farmers exhibit higher in-group bias in cooperation after harvest when they are less financially constrained.*

### **3.3 In-group bias in (cooperative) norm enforcement**

This section shows how farmers in the before- and the after-harvest sessions punish an in-group or an out-group defector in a prisoner's dilemma experiment with third-party punishment. Before harvest, farmers do not punish an out-group and an in-group defector differently [means of punishment amount (for two cases where A1 defects)<sup>4</sup> are 4.36 Baht for out-group vs 3.74 Baht for in-group defectors; Wilcoxon rank-sum test,  $p = 0.42$ ], whereas after harvest, farmers punish an out-group defector significantly more than an in-group defector [means are 5.34 Baht for out-group vs. 3.02 Baht for in-group defectors; Wilcoxon rank-sum test,  $p < 0.01$ ], as shown in Figure 3. These findings are also robust, as shown by the OLS regression Models IX through XII in Table 5.

Although parochialism increases substantially after harvest—parochial cooperation rates (in-group minus out-group cooperation rate) almost double—and parochial norm enforcement (out-group minus in-group punishment) almost triples, the difference in the difference is not statistically significant at conventional levels (see Table A6 in Appendix E for the regression results).

Looking at the punishment amounts separately for each group composition of the prisoner's dilemma with third-party punishment, Figure 4 shows the punishment amount that B-players assigned to A1, both cooperators and defectors, when A2 cooperated. Each line represents the deduction points or the punishment amount for each group composition. In Figure 4 we can see an in-group bias for norm enforcement more clearly in after-harvest than in before-harvest sessions as well: after harvest, out-group defectors were more punished than in-group defectors, especially when an out-group defector was paired with an in-group partner who cooperated.

---

<sup>4</sup> There are four cases in total regarding who defects and who cooperates: (1) A1 and A2 defect; (2) A1 cooperates / A2 defects; (3) A1 defects / A2 cooperates; (4) A1 and A2 cooperate.

Result 3: In-group bias in norm enforcement exists after harvest, when farmers are less financially constrained.

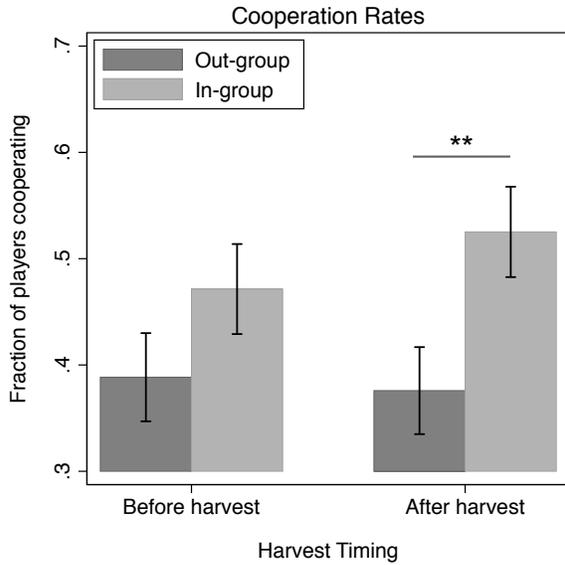


Figure 2: Cooperation rates with in-group and out-group players before vs. after harvest

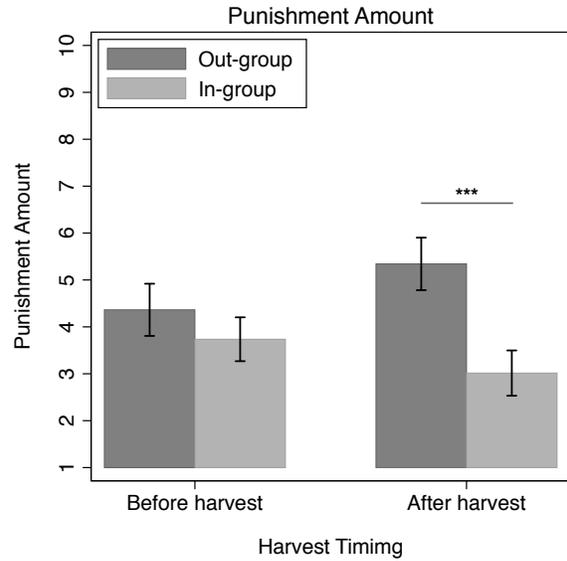


Figure 3: Punishment for in-group and out-group defectors before vs. after harvest

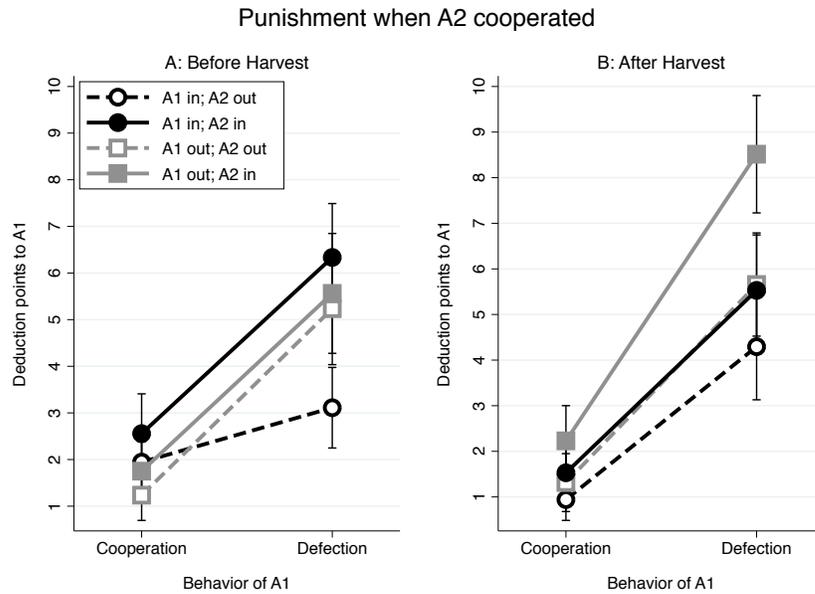


Figure 4: Punishment amount for defectors when A2 cooperated

Table 5: Regressions of decisions in all experiments

Dependent Variable: Specification:	Sharing in Dictator game				Cooperation in prisoner's dilemma				Punishment on defectors in PD w punishment			
	OLS		OLS		Logit		Logit		OLS		OLS	
Timing:	Before Harvest		After Harvest		Before Harvest		After Harvest		Before Harvest		After Harvest	
Model:	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)	(XI)	(XII)
In-group (dummy)	4.27*	4.02*	4.31*	3.83*	0.08	0.07	0.15**	0.13**	-0.63	-0.84	-2.33***	-2.28***
	(2.22)	(2.30)	(2.26)	(2.28)	(0.06)	(0.06)	(0.06)	(0.06)	(0.86)	(0.87)	(0.79)	(0.83)
Age		0.03		-0.33**		-0.002		-0.008*		0.03		-0.06
		(0.12)		(0.14)		(0.003)		(0.004)		(0.06)		(0.05)
Female		-3.05		-7.50**		-0.005		-0.08		0.24		-1.05
		(2.63)		(2.96)		(0.07)		(0.08)		(1.12)		(1.03)
Education (Years in school)		0.31		-0.53		0.02		0.008		0.13		-0.15
		(0.39)		(0.47)		(0.01)		(0.01)		(0.18)		(0.19)
In debt (dummy)		-3.41		5.11		0.12		0.05		-1.99		-0.81
		(3.62)		(3.63)		(0.10)		(0.10)		(1.25)		(1.70)
Sold rice this year (dummy)		2.92		-3.69		0.11		0.13**		-1.19		-0.05
		(2.56)		(2.24)		(0.07)		(0.06)		(1.03)		(0.82)
Sharing (Dictator game)						0.01***		0.008***		-0.01		-0.03*
						(0.002)		(0.002)		(0.02)		(0.02)
Trust level						0.01		0.02				
						(0.01)		(0.02)				
Risk level						-0.003		-0.01				
						(0.003)		(0.01)				
Constant	33.06***	32.69***	32.45***	55.94***					4.36***	4.90	5.34***	12.11***
	(1.71)	(9.30)	(1.69)	(10.79)					(0.67)	(4.72)	(0.62)	(3.76)
Observations	279	279	280	280	279	279	280	280	276	276	276	276
Individuals	279	279	280	280	279	279	280	280	138	138	138	138

Notes: Logit models present marginal effects. Trust level ranges from 0–10 for the question “Do you think that other people only have the best intentions?” Risk level ranges from 0–10 from the question “Are you a person who is generally willing to take risks, or do you try to avoid taking risks?” Robust standard errors are clustered by individual in parentheses. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01.

## 4 Conclusion

We study the *causal* effects of financial constraints on in-group bias in prosocial behaviors, namely cooperation, norm enforcement and sharing. It is an important question to understand how financial situations affect parochialism in prosocial behavior. We conducted economic experiments with low-income rice farmers in rural Thailand to elicit their prosocial behaviors before harvest, when farmers are more financially constrained, and after harvest, when they are less constrained.

Our results show that while sharing preferences (measured using dictator games) are not affected by financial constraints, a result in line with Bartos (2016), cooperation and norm enforcement are. Farmers exhibit in-group bias in cooperation and norm enforcement only after harvest, when they are less financially constrained. Being financially constrained does not create parochialism per se, which is in line with Aksoy and Palma (2019) using different games in Guatemala with coffee farmers. Being more financially constrained therefore does not create a competition for scarce resources, which increases parochialism (Goette et al. 2012). And despite previous evidence that in recessions, individualism increases (Bianchi 2016), it seems not to become in-group bias.

One potential explanation for our result of financial constraints leading to less parochialism could be the effect of scarcity on cognitive functioning (Shah et al. 2012; Mullainathan and Shafir 2013). Being financially constrained could affect cognitive function and lead to more intuitive thinking. While there is a growing literature arguing that intuitive thinking increases prosocial behavior, our result indicates that enhanced intuitive thinking in times of tighter financial constraints leads to less parochialism. And although our research design addresses relative financial-constraint levels and cannot show the exact mechanism, our result could be seen as a first step towards better understanding the effect of financial constraints with its implications for cognitive function and intuitive thinking on parochialism.

### Acknowledgments

We thank Billur Aksoy, Vojtech Batos, Lorenz Goette, Agne Kajackaite, Marco Palma, Matthias Sutter for comments. We also thank Chairroj Thanasanti, Pakin Thiradejsrivong, Angkhaana Phaliphatana from Community Development Department, as well as Rada Khruensing, Wilasinee

Mongkolsri, Burin Chotichaicharin, Siriporn Namdang, and Sunisa Peungtrakool for their assistance in the field. Financial support from Columbia Business School is gratefully acknowledged.

This research involves human subjects. Approval for this research was obtained from the Institutional Review Board at Columbia University from February 6, 2017 to January 6, 2018 with protocol number AAAR3785.

## References

- Akerlof, George A, and Rachel E Kranton. 2005. "Identity and the Economics of Organizations." *Journal of Economic Perspectives* 19 (1): 9–32. <https://doi.org/10.1257/0895330053147930>.
- Akerlof, George A., and Rachel E. Kranton. 2000. "Economics and Identity." *Quarterly Journal of Economics* 115 (3): 715–53. <https://doi.org/10.1162/003355300554881>.
- Aksoy, Billur, and Marco A. Palma. 2019. "The Effects of Scarcity on Cheating and In-Group Favoritism." *Journal of Economic Behavior & Organization* 165 (September): 100–117. <https://doi.org/10.1016/j.jebo.2019.06.024>.
- Andreoni, James, Nikos Nikiforakis, and Jan Stoop. 2017. "Are the Rich More Selfish than the Poor, or Do They Just Have More Money? A Natural Field Experiment." NBER Working Paper 23229.
- Aron, Arthur, Elaine N. Aron, and Danny Smollan. 1992. "Inclusion of Other in the Self Scale and the Structure of Interpersonal Closeness." *Journal of Personality and Social Psychology* 63 (4): 596–612. <https://doi.org/10.1037/0022-3514.63.4.596>.
- Ashraf, Nava, Iris Bohnet, and Nikita Piankov. 2006. "Decomposing Trust and Trustworthiness." *Experimental Economics* 9 (3): 193–208. <https://doi.org/10.1007/s10683-006-9122-4>.
- Bartos, Vojtech. 2016. "Seasonal Scarcity and Sharing Norms." CERGE-EI Working Paper Series 557.

- Bauer, Michal, Christopher Blattman, Julie Chytilová, Joseph Henrich, Edward Miguel, and Tamar Mitts. 2016. “Can War Foster Cooperation?” *Journal of Economic Perspectives* 30 (3): 249–74. <https://doi.org/10.1257/jep.30.3.249>.
- Bianchi, Emily C. 2016. “American Individualism Rises and Falls with the Economy: Cross-Temporal Evidence That Individualism Declines When the Economy Falters.” *Journal of Personality and Social Psychology* 111 (4): 567–84. <https://doi.org/10.1037/pspp0000114>.
- Boonmanunt, Suparee, Agne Kajackaite, and Stephan Meier. 2019. “Poverty Negates the Impact of Social Norms on Cheating.” Unpublished.
- Bowles, Samuel, Jung-Kyoo Choi, and Astrid Hopfensitz. 2003. “The Co-Evolution of Individual Behaviors and Social Institutions.” *Journal of Theoretical Biology* 223 (2): 135–47. [https://doi.org/10.1016/S0022-5193\(03\)00060-2](https://doi.org/10.1016/S0022-5193(03)00060-2).
- Carvalho, Leandro S., Stephan Meier, and Stephanie W. Wang. 2016. “Poverty and Economic Decision-Making: Evidence from Changes in Financial Resources at Payday.” *American Economic Review* 106 (2): 260–84. <https://doi.org/10.1257/aer.20140481>.
- Cassar, Alessandra, Andrew Healy, and Carl von Kessler. 2017. “Trust, Risk, and Time Preferences After a Natural Disaster: Experimental Evidence from Thailand.” *World Development* 94 (June): 90–105. <https://doi.org/10.1016/j.worlddev.2016.12.042>.
- Charness, Gary, Luca Rigotti, and Aldo Rustichini. 2007. “Individual Behavior and Group Membership.” *American Economic Review* 97 (4): 1340–52. <https://doi.org/10.1257/aer.97.4.1340>.
- Chen, Roy, and Yan Chen. 2011. “The Potential of Social Identity for Equilibrium Selection.” *American Economic Review* 101 (6): 2562–89. <https://doi.org/10.1257/aer.101.6.2562>.
- Chen, Yan, and Sherry Xin Li. 2009. “Group Identity and Social Preferences.” *American Economic Review* 99 (1): 431–57. <https://doi.org/10.1257/aer.99.1.431>.

- Choi, Jung-Kyoo, and Samuel Bowles. 2007. "The Coevolution of Parochial Altruism and War." *Science* 318 (5850): 636–40. <https://doi.org/10.1126/science.1144237>.
- Chudek, Maciej, and Joseph Henrich. 2011. "Culture–Gene Coevolution, Norm–Psychology and the Emergence of Human Prosociality." *Trends in Cognitive Sciences* 15 (5): 218–26. <https://doi.org/10.1016/j.tics.2011.03.003>.
- Falk, Armin, Anke Becker, Thomas Dohmen, Benjamin Enke, David Huffman, and Uwe Sunde. 2018. "Global Evidence on Economic Preferences\*." *The Quarterly Journal of Economics* 133 (4): 1645–92. <https://doi.org/10.1093/qje/qjy013>.
- Fehr, Ernst, and Urs Fischbacher. 2004. "Third-Party Punishment and Social Norms." *Evolution and Human Behavior* 25 (2): 63–87. [https://doi.org/10.1016/S1090-5138\(04\)00005-4](https://doi.org/10.1016/S1090-5138(04)00005-4).
- Fehr, Ernst, Urs Fischbacher, and Simon Gächter. 2002. "Strong Reciprocity, Human Cooperation, and the Enforcement of Social Norms." *Human Nature* 13 (1): 1–25. <https://doi.org/10.1007/s12110-002-1012-7>.
- Fehr, Ernst, and Simon Gächter. 2000. "Cooperation and Punishment in Public Goods Experiments." *The American Economic Review* 90 (4): 980–94. <http://www.jstor.org/stable/117319>.
- Fisman, Raymond, Pamela Jakiela, and Shachar Kariv. 2015. "How Did Distributional Preferences Change during the Great Recession?" *Journal of Public Economics* 128 (August): 84–95. <https://doi.org/10.1016/j.jpubeco.2015.06.001>.
- Gintis, Herbert, Joseph Henrich, Samuel Bowles, Robert Boyd, and Ernst Fehr. 2008. "Strong Reciprocity and the Roots of Human Morality." *Social Justice Research* 21 (2): 241–53. <https://doi.org/10.1007/s11211-008-0067-y>.
- Glaeser, Edward L., David I. Laibson, Jose A. Scheinkman, and Christine L. Soutter. 2000. "Measuring Trust." *Quarterly Journal of Economics* 115 (3): 811–46. <https://doi.org/10.1162/003355300554926>.

- Gneezy, A., and D. M. T. Fessler. 2012. "Conflict, Sticks and Carrots: War Increases Prosocial Punishments and Rewards." *Proceedings of the Royal Society B: Biological Sciences* 279 (1727): 219–23. <https://doi.org/10.1098/rspb.2011.0805>.
- Goette, Lorenz, David Huffman, and Stephan Meier. 2006. "The Impact of Group Membership on Cooperation and Norm Enforcement: Evidence Using Random Assignment to Real Social Groups." *American Economic Review* 96 (2): 212–16. <https://doi.org/10.1257/000282806777211658>.
- Goette, Lorenz, David Huffman, Stephan Meier, and Matthias Sutter. 2012. "Competition Between Organizational Groups: Its Impact on Altruistic and Antisocial Motivations." *Management Science* 58 (5): 948–60. <https://doi.org/10.1287/mnsc.1110.1466>.
- Haushofer, J., and E. Fehr. 2014. "On the Psychology of Poverty." *Science* 344 (6186): 862–67. <https://doi.org/10.1126/science.1232491>.
- Henrich, Joseph. 2004. "Cultural Group Selection, Coevolutionary Processes and Large-Scale Cooperation." *Journal of Economic Behavior & Organization* 53 (1): 3–35. [https://doi.org/10.1016/S0167-2681\(03\)00094-5](https://doi.org/10.1016/S0167-2681(03)00094-5).
- Hofstede, Geert. 2001. *Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations Across Nations*. Second. Thousand Oaks, CA: SAGE.
- Inglehart, Ronald. 1997. *Modernization and Postmodernization: Cultural, Economic, and Political Change in 43 Societies*. Princeton, New Jersey: Princeton University Press.
- Jiang, Danling, and Sonya S. Lim. 2018. "Trust and Household Debt." *Review of Finance* 22 (2): 783–812. <https://doi.org/10.1093/rof/rfw055>.
- Kawasaki, Jintana. 2010. "Thailand's Rice Farmers Adapt to Climate Change." <https://ourworld.unu.edu/en/climate-change-adaptation-for-thailands-rice-farmers> (accessed April 17, 2018).

- Kessler, Judd B., and Stephan Meier. 2014. "Learning from (Failed) Replications: Cognitive Load Manipulations and Charitable Giving." *Journal of Economic Behavior & Organization* 102 (June): 10–13. <https://doi.org/10.1016/j.jebo.2014.02.005>.
- Kosfeld, Michael, and Devesh Rustagi. 2015. "Leader Punishment and Cooperation in Groups: Experimental Field Evidence from Commons Management in Ethiopia." *American Economic Review* 105 (2): 747–83. <https://doi.org/10.1257/aer.20120700>.
- Mani, A., S. Mullainathan, E. Shafir, and J. Zhao. 2013. "Poverty Impedes Cognitive Function." *Science* 341 (6149): 976–80. <https://doi.org/10.1126/science.1238041>.
- Meier, Stephan, Lamar Pierce, Antonino Vaccaro, and Barbara La Cara. 2016. "Trust and In-Group Favoritism in a Culture of Crime." *Journal of Economic Behavior & Organization* 132 (December): 78–92. <https://doi.org/10.1016/j.jebo.2016.09.005>.
- Mullainathan, Sendhil, and Eldar Shafir. 2013. *Scarcity: Why Having Too Little Means So Much*. First. New York: Times Books.
- Olken, Benjamin A., and Rohini Pande. 2012. "Corruption in Developing Countries." *Annual Review of Economics* 4 (1): 479–509. <https://doi.org/10.1146/annurev-economics-080511-110917>.
- Ostrom, Elinor. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. New York: Cambridge University Press.
- Piff, P. K., D. M. Stancato, S. Cote, R. Mendoza-Denton, and D. Keltner. 2012. "Higher Social Class Predicts Increased Unethical Behavior." *Proceedings of the National Academy of Sciences* 109 (11): 4086–91. <https://doi.org/10.1073/pnas.1118373109>.
- Piff, Paul K., Michael W. Kraus, Stéphane Côté, Bonnie Hayden Cheng, and Dacher Keltner. 2010. "Having Less, Giving More: The Influence of Social Class on Prosocial Behavior." *Journal of Personality and Social Psychology* 99 (5): 771–84. <https://doi.org/10.1037/a0020092>.

- Prediger, Sebastian, Björn Vollan, and Benedikt Herrmann. 2014. "Resource Scarcity and Antisocial Behavior." *Journal of Public Economics* 119 (November): 1–9. <https://doi.org/10.1016/j.jpubeco.2014.07.007>.
- Prediger, Sebastian, Björn Vollan, and Benedikt Herrmann. 2013. "Resource Scarcity, Spite and Cooperation." GIGA Working Paper Series 227.
- Rand, David G, Joshua D Greene, and Martin A Nowak. 2012. "Spontaneous Giving and Calculated Greed." *Nature* 489 (September): 427. <https://doi.org/10.1038/nature11467>.
- Rand, David G. 2016. "Cooperation, Fast and Slow." *Psychological Science* 27 (9): 1192–1206. <https://doi.org/10.1177/0956797616654455>.
- Rao, Li-Lin, Ru Han, Xiao-Peng Ren, Xin-Wen Bai, Rui Zheng, Huan Liu, Zuo-Jun Wang, Jin-Zhen Li, Kan Zhang, and Shu Li. 2011. "Disadvantage and Prosocial Behavior: The Effects of the Wenchuan Earthquake." *Evolution and Human Behavior* 32 (1): 63–69. <https://doi.org/10.1016/j.evolhumbehav.2010.07.002>.
- Ray, Debraj, and Joan Esteban. 2017. "Conflict and Development." *Annual Review of Economics* 9 (1): 263–93. <https://doi.org/10.1146/annurev-economics-061109-080205>.
- Rustagi, Devesh, Stefanie Engel, and Michael Kosfeld. 2010. "Conditional Cooperation and Costly Monitoring Explain Success in Forest Commons Management." *Science* 330 (6006): 961–65. <https://doi.org/10.1126/science.1193649>.
- Schulz, Jonathan F., Urs Fischbacher, Christian Thöni, and Verena Utikal. 2014. "Affect and Fairness: Dictator Games under Cognitive Load." *Journal of Economic Psychology* 41 (April): 77–87. <https://doi.org/10.1016/j.joep.2012.08.007>.
- Shah, A. K., S. Mullainathan, and E. Shafir. 2012. "Some Consequences of Having Too Little." *Science* 338 (6107): 682–85. <https://doi.org/10.1126/science.1222426>.
- Shah, Anuj K., Eldar Shafir, and Sendhil Mullainathan. 2015. "Scarcity Frames Value." *Psychological Science* 26 (4): 402–12. <https://doi.org/10.1177/0956797614563958>.

The World Bank. 2019. “PPP Conversion Factor, Private Consumption Tle.”

<https://data.worldbank.org/indicator/PA.NUS.PPP?locations=TH> (accessed July 3, 2019).

Tinghög, Gustav, David Andersson, Caroline Bonn, Harald Böttiger, Camilla Josephson, Gustaf Lundgren, Daniel Västfjäll, Michael Kirchler, and Magnus Johannesson. 2013. “Intuition and Cooperation Reconsidered.” *Nature* 498 (June): E1.

<https://doi.org/10.1038/nature12194>.

## Appendices

### Appendix A: Subject Pool

Our participants are low-income rice farmers from 48 villages in Ubon Ratchathani, in northeastern Thailand (see Map in Figure A5). As rice is the main food in Thai society (see e.g. Kawasaki, 2010), rice farming is tremendously crucial to farmers' subsistence, whether cultivated for farmers' own consumption or for commercial purposes. Our participants cultivate rice once a year during the rainy season (May–October). Rice is then harvested at the end of November until the beginning of December, depending on the weather that year. During these months, farmers invest a substantial amount in rice farming, such as for fertilizer, or to hire a tractor for land preparation (on average 18% of total annual expenditures for our participants).

Farmers who harvest more rice than their estimated annual household consumption sell the rest shortly after harvest (late November or December) for cash. Earning cash from selling the rice and the rice produced for subsistence consumption lead farmers to face significantly fewer financial constraints after harvest than before harvest.

All participants are rice farmers, and 92% consider rice farming to be their main occupation (91% before harvest and 93% after harvest). However, just 65% (71% before harvest and 59% after harvest) sold their rice in 2017—not every farmer sells their rice harvest in a particular year. Most engage in multiple occupations to cover their expenses, such as farming other crops, performing wage work, or owning livestock or a small business. Around 90% of the participants in both the before- and the after-harvest sessions are in debt, showing that they always face financial constraints.

Table 1 summarizes the main socio-demographic characteristics of our participants and shows that they are similar for the before- and after-harvest groups. The average age is 49 years in the before-harvest group and 50 years in the after-harvest group. The majority of participants are female: 71% before harvest and 74% after harvest. The nature of our activities might draw more attention from female farmers than from their male counterparts. Female in Thai rural areas might feel more comfortable than males sitting still for hours and participating in indoors activities that require concentration and calculating. Participants in both the before- and the after-harvest sessions spent on average around 6 to 7 years in school, which would mean they completed elementary school. The average number of children is 2.47 for the before-harvest participants and 2.45 for the

after-harvest participants. The income generated from rice harvesting is on average THB 7204 for the before-harvest group and THB 7999 for the after-harvest group.<sup>1</sup>

## **Appendix B: Details of the experiments**

### **Experimental sessions**

We conducted the experiments with 568 rice farmers who cultivate rice once a year: 283 farmers before harvest and 285 different farmers after harvest. We conducted 24 before-harvest sessions in 24 villages, one session in each village, during the period 25–30 September 2017, and 24 after-harvest sessions in another 24 villages during the period 8–14 December 2017.

We recruited 12 farmers in each village through brochures. Interested farmers had to register for the experiment with a community leader suggested by the Community Development Department. Where there more than 12 farmers registered, we randomly chose 12 farmers who could participate in this study. On the experimental days, however, some registered farmers did not show up. Consequently, there were 9 to 12 participants in each session: 12 participants in 45 sessions (before harvest: 22, after harvest: 23), 10 in two sessions (before harvest: 1, after-harvest: 1) and 9 in one session (only before harvest). Only one session was conducted in each village. However, nine participants did not grow rice this year, so they are dropped from later analyses.

---

<sup>1</sup> We use household effective income in September 2017 to represent the income before harvest. For the after-harvest income, we use a proxy which is an average of the effective income in November and December 2017. We need to use this proxy because in 2017, as a result of abundant rainfall, harvest happened in late November instead of in December as usual. Therefore, when the before-harvest group was reporting their income, they reported November as a before-harvest month and December as the harvest month. The after-harvest group, on the other hand, reported November as the harvest month and December as the after-harvest month.

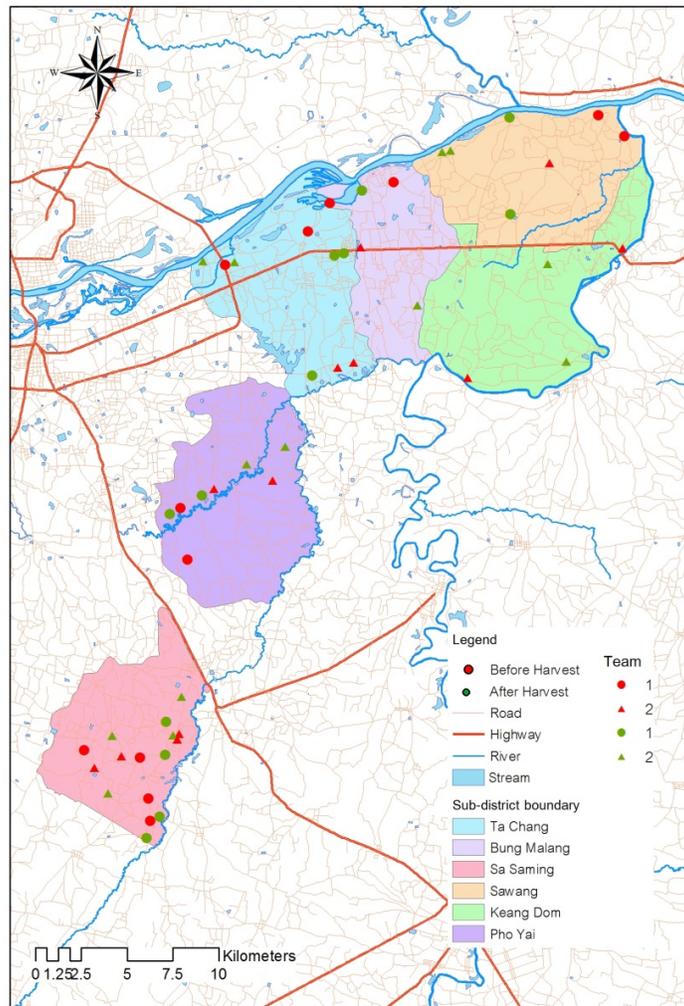


Figure A5: Map of study sites

### Experimental procedure

We conducted four one-shot, pen-and-paper experiments with the farmers in all sessions. All farmers played four games: a prisoner’s dilemma, a prisoner’s dilemma with third-party punishment, a dictator game, and a cheating game<sup>2</sup> respectively. All decisions were made in private. The order of the experiments was the same for all participants in all 48 sessions. Feedback about experimental earnings from each game was provided only at the end of the experiment and not during the experiment.

<sup>2</sup> In this paper we focus on the results of the first three games: a prisoner’s dilemma, a prisoner’s dilemma with third-party punishment and a dictator game.

The protocol was as follows. First, participants drew a seat number randomly (from 1 to 12) and took the corresponding seat. After they signed the consent form, we explained the experiments to them. They were informed that there would be four decision activities and that we would explain the rules of each game at the beginning of that particular game. After an experimenter described the game through a written script and presentation materials, participants had to answer test questions correctly. Only then did we proceed with the experiment.

Plastic cubicles and folders for storing answer sheets were used to keep decisions private. Furthermore, in each session there was one experimenter who guided the experiments and another who sat nearby and typed farmers' decisions into a computer after each decision. The experimenter inside could see participants' faces but not their decisions, whereas the experimenter outside could see participants' decisions but not their faces. With this procedure we could not identify participants' answers. After the experiment, participants responded to a questionnaire face-to-face with an interviewer, who did not know any of their decisions in the experiments. Finally, we paid farmers directly at the end of each session in cash.

The whole session took on average 74 minutes. Then the post-experiment questionnaire section took an additional 96 minutes, whereas it took around 20 minutes to interview a person. Since there were only 3 to 4 assistants in each session, some participants had to wait to be interviewed. The average experimental earnings were 279 Baht (8.45 USD, equivalent to the purchasing power of 22.39 USD).<sup>3</sup> Participants received an additional 100 Baht as a show-up fee (around 3 USD, equivalent to the purchasing power of 8.03 USD) and 100 Baht for the interview. This additional payment for the interview was announced after the experiments so that it could not influence farmers' experimental decisions.

## **Pilots**

Prior to the experiments we conducted two pilots to test the protocol, instructions and other instruments and to train our research assistants to conduct the experiments smoothly. The first was with 24 Thai undergraduate students at Mahidol University, divided into two sessions, on 2 August 2017. On 20 August 2017, we ran a second pilot with 24 actual rice farmers in another district of Ubon Ratchathani, also divided in two sessions.

---

<sup>3</sup> The exchange rate of 1 USD was 33 Thai Baht on experimental days. However, the purchasing power parity (PPP) conversion factor (GDP) is 12.46 Thai Baht per 1 USD in 2017 (World Bank 2019).

## Appendix C: Instructions for the Experiment

### Instructions

(Used to explain the experiment to the participants verbally)

Note: Phrases/sentences in *(parentheses)* are notes for the instructors to lead the experiment and are not to read out loud to participants.

### General information

Hello everyone. Thank you everyone for joining our activity today. Welcome. This project studies decision-making under uncertainty of rice farmers in Ubon Ratchathani. This research is collaboration between Mahidol University, Thailand and Columbia University, USA and is funded by Columbia University.

#### *(Earn real money)*

Today we are going to complete 4 activities and conduct a questionnaire. You have already earned 100 Baht for showing-up today. In addition, you will earn more money from the four activities. Your earnings depend on your decisions and decisions of others. You will receive your payoff in cash directly after today's activity. All activities will take around 3 hours.

#### *(Anonymity)*

We will identify your decisions only with your cubicle number. The experimenter outside will record your decisions by your cubicle number. He/she does not know who you are, your name or your appearance. So now nobody will be able to link your decisions with your name and identity.

#### *(Consent form)*

It seems like everyone would like to start, doesn't it? Before we start, please sign this consent form. The consent form contains the information stated earlier. In addition, it is stated that

...

- In the data analysis, we will not link your decisions with your identity but only with your cubicle number
- Your decisions will be kept confidentially
- You participate in these activities voluntarily
- You can withdraw from the study any time. In that case, you will be paid only 100 Baht for showing up
- If you have any questions, please contact Suparee Boonmanunt, Mahidol University. Email: suparee.boon@mahidol.edu. Tel: 024415000 ext 2213.

#### *(More ...)*

There is another team conducting the same activities with farmers from another village. Please do not communicate with others during these activities for your own sake. If you have any questions during the activities, please raise your hand and we will come to you. If you violate the rules, we will ask you to leave the experiment without any additional payment. Any questions so far?

## Activity 1

### Situation

In this activity, you are randomly matched with another participant. Throughout the activities you will not know who you are matched to. In each pair, there are “you (1)” and “your match (2)”. Both receive the endowment of 40 Baht.

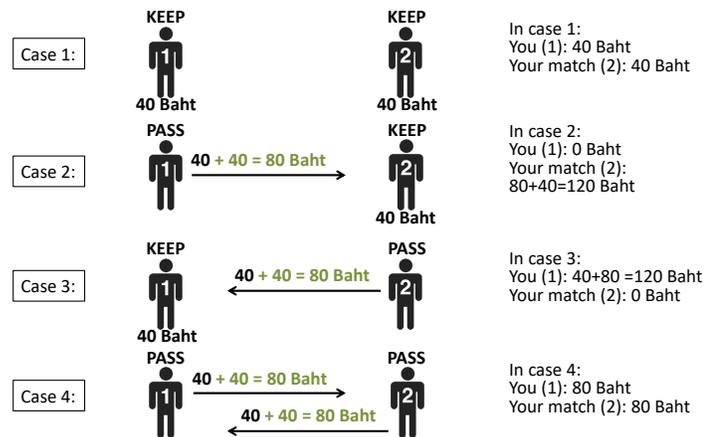
### What can you do?

Let’s look first from Person 1’s point of view.

- Keep: You keep 40 Baht for yourself.
- Pass: You can pass 40 Baht to your match. We will double the amount of money to your match, so he will get 80 Baht.

You have to decide for Keep or Pass at the same time as your match. So, you will not know your match’s decision. Thus, there are four possible scenarios. (*Distribute the scenarios sheet*).

### Four possible scenarios



### Do you understand?

Please answer the following questions to see whether you really understand this activity. See all four scenarios on the sheet we are going to distribute. (*Distribute the scenario sheet*). If you have any question, please raise your hand and we will come to you. (*Distribute the test questions*).

### Test question 1

If both you (1) and your match (2) keep the money, how much do you and your match will earn?

- You  will earn ..... Baht
- Your match  will earn ..... Baht

### Test question 2

If both you (1) and your match (2) pass the money, how much do you and your match will earn?

- You  will earn ..... Baht
- Your match  will earn ..... Baht

### Test question 3

If you (1) keep and your match (2) passes the money, how much do you and your match will earn?

- You  will earn ..... Baht
- Your match  will earn ..... Baht

### Test question 4

If you (1) pass and your match (2) keeps the money, how much do you and your match will earn?

- You  will earn ..... Baht
- Your match  will earn ..... Baht

*(Collect the test questions)*

### **Your partner**

You will be randomly matched with either a participant from your village or from another village. You will see on your answer sheet whether you are matched with a person from your village or from another village. A participant from your village will have the same color as yours (black). A participant from another village will have another color (white).

### **Your decision**

*(Explain these two answer sheets)*

**The decision**

- Remember, you are 
- Your match  is from your village

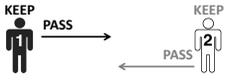


- Please make your decision now by crossing on

<input type="radio"/> KEEP	<input type="radio"/> PASS
----------------------------	----------------------------

**The decision**

- Remember, you are 
- Your match  is from another village



- Please make your decision now by crossing on

<input type="radio"/> KEEP	<input type="radio"/> PASS
----------------------------	----------------------------

**Distribute the answer sheet.**

**Done?**

Please write down your cubicle number on the upper right corner. If you are done, please close the folder. Please wait quietly until we continue with the next activity.

## Activity 2

### Situation

- There are two stages in this activity.
- There will be additionally two more people involved.
- You will get one out of four roles. There are ‘No-hat’ people like in the previous activity and the new two ‘Hat’ people.
- We will slowly explain who will do what.



### Stage 1

- The situation and decisions are the same as in the previous activity
- Starting with the random assignment. In each pair, there are “Person 1” and “Person 2”



- Both receive the endowment of 40 Baht to KEEP or PASS
- (Use the magnet chart to explain the game as in the previous activity.)

### Stage 2

- There are another two participants with hats who have a new task
- Hat 1 and Hat 2 receive the endowment of 140 Baht
- No-hat 1 and No-hat 2 (decide in stage 1) receive additional 20 Baht



**What do Hat people do?**



- **In stage 2** Hat people can reduce payoffs of No-hat people.
- Hat 1 can reduce No-hat 1's payoff.
- Hat 2 can reduce No-hat 2's payoff.
- But Hat has to reduce his/her own payoff to reduce No-hat's payoff.
- Every Baht that Hat reduces his/her own payoff will reduce No-hat's payoff for 3 Baht.

**Reduction table**

Decision  : Reduce one's own payoff (Baht)	Payoff of reduces for (Baht) "x3"	Decision  : Reduce one's own payoff (Baht)	Payoff of reduces for (Baht) "x3"
0	0	12	36
2	6	14	42
4	12	16	48
6	18	18	54
8	24	20	60
10	30		

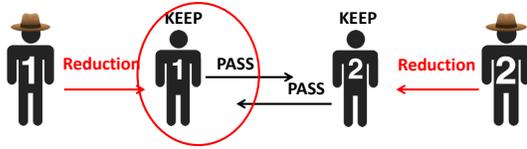
**Your role**

- In this activity you will be either No-hat 1 or Hat 1.
- Let's focus only on these two people (point at No-hat 1 and Hat 1)

**No-hat 1's decision**

If you are No-hat 1:

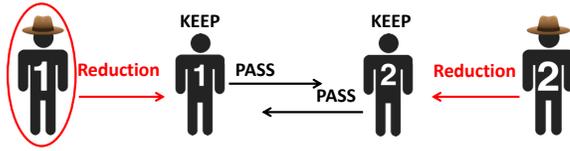
- You will decide in **stage 1**: KEEP or PASS
- In stage 2 your payoff can be reduced by Hat 1
- In stage No-hat 2's payoff can be reduced by Hat 2
- No-hat 2, Hat 1 and Hat 2 can be either from your village or another village



### Hat 1's decision

If you are Hat 1:

- You will decide in **stage 2**: How much you will reduce your own payoff to reduce the payoff of your assigned No-hat 1
- No-hat 2's payoff can be reduced by Hat 2
- No-hat 1, No-hat 2 and Hat 2 can be either from your village or another village



- Both Hat and No-hat people decide simultaneously.
- As Hat 1 makes a decision about reduction of No-hat 1's payoff, Hat 1 does not know how No-hat 1 decides.
- Hat 1 thus has to decide for all four possible cases.
- (show the chart for four possible cases and put it aside)*
- If you are Hat 1, you will have to make a decision for each of the four possible cases.
- You will receive the following four answer sheets.
- (Explain each answer sheet)*

### Decision for case 1

You can reduce Person 1's payoff by reducing your own payoff. Please choose the option you like the most, only 1 option.

Case 1:

40+20=60 Baht      40+20=60 Baht

<input type="radio"/> Reduce 0 B	You : 140 B (1): 60 B	<input type="radio"/> Reduce 12 B	You : 140-12 = 128 B (1): 60-36 = 24 B
<input type="radio"/> Reduce 2 B	You : 140-2 = 138 B (1): 60-6 = 54 B	<input type="radio"/> Reduce 14 B	You : 140-14 = 126 B (1): 60-42 = 18 B
<input type="radio"/> Reduce 4 B	You : 140-4 = 136 B (1): 60-12 = 48 B	<input type="radio"/> Reduce 16 B	You : 140-16 = 124 B (1): 60-48 = 12 B
<input type="radio"/> Reduce 6 B	You : 140-6 = 134 B (1): 60-18 = 42 B	<input type="radio"/> Reduce 18 B	You : 140-18 = 122 B (1): 60-54 = 6 B
<input type="radio"/> Reduce 8 B	You : 140-8 = 132 B (1): 60-24 = 36 B	<input type="radio"/> Reduce 20 B	You : 140-20 = 120 B (1): 60-60 = 0 B
<input type="radio"/> Reduce 10 B	You : 140-10 = 130 B (1): 60-30 = 30 B		

### Decision for case 2

You can reduce Person 1's payoff by reducing your own payoff. Please choose the option you like the most, only 1 option.

Case 2:

0+20=20 Baht      120+20=140 Baht

<input type="radio"/> Reduce 0 B	You : 140 B (1): 20 B	<input type="radio"/> Reduce 12 B	You : 140-12 = 128 B (1): 20-36 = 0 B
<input type="radio"/> Reduce 2 B	You : 140-2 = 138 B (1): 20-6 = 14 B	<input type="radio"/> Reduce 14 B	You : 140-14 = 126 B (1): 20-42 = 0 B
<input type="radio"/> Reduce 4 B	You : 140-4 = 136 B (1): 20-12 = 8 B	<input type="radio"/> Reduce 16 B	You : 140-16 = 124 B (1): 20-48 = 0 B
<input type="radio"/> Reduce 6 B	You : 140-6 = 134 B (1): 20-18 = 2 B	<input type="radio"/> Reduce 18 B	You : 140-18 = 122 B (1): 20-54 = 0 B
<input type="radio"/> Reduce 8 B	You : 140-8 = 132 B (1): 20-24 = 0 B	<input type="radio"/> Reduce 20 B	You : 140-20 = 120 B (1): 20-60 = 0 B
<input type="radio"/> Reduce 10 B	You : 140-10 = 130 B (1): 20-30 = 0 B		

### Decision for case 3

You can reduce Person 1's payoff by reducing your own payoff. Please choose the option you like the most, only 1 option.

Case 3:  $120+20=140$  Baht     $0+20=20$  Baht

<input type="radio"/> Reduce 0 B	You : 140 B (1): 140 B	<input type="radio"/> Reduce 12 B	You : 140-12 = 128 B (1): 140-36 = 104 B
<input type="radio"/> Reduce 2 B	You : 140-2 = 138 B (1): 140-6 = 134 B	<input type="radio"/> Reduce 14 B	You : 140-14 = 126 B (1): 140-42 = 98 B
<input type="radio"/> Reduce 4 B	You : 140-4 = 136 B (1): 140-12 = 128 B	<input type="radio"/> Reduce 16 B	You : 140-16 = 124 B (1): 140-48 = 92 B
<input type="radio"/> Reduce 6 B	You : 140-6 = 134 B (1): 140-18 = 122 B	<input type="radio"/> Reduce 18 B	You : 140-18 = 122 B (1): 140-54 = 86 B
<input type="radio"/> Reduce 8 B	You : 140-8 = 132 B (1): 140-24 = 116 B	<input type="radio"/> Reduce 20 B	You : 140-20 = 120 B (1): 140-60 = 80 B
<input type="radio"/> Reduce 10 B	You : 140-10 = 130 B (1): 140-30 = 110 B		

### Decision for case 4

You can reduce Person 1's payoff by reducing your own payoff. Please choose the option you like the most, only 1 option.

Case 4:  $80+20=100$  Baht     $80+20=100$  Baht

<input type="radio"/> Reduce 0 B	You : 140 B (1): 100 B	<input type="radio"/> Reduce 12 B	You : 140-12 = 128 B (1): 100-36 = 64 B
<input type="radio"/> Reduce 2 B	You : 140-2 = 138 B (1): 100-6 = 94 B	<input type="radio"/> Reduce 14 B	You : 140-14 = 126 B (1): 100-42 = 58 B
<input type="radio"/> Reduce 4 B	You : 140-4 = 136 B (1): 100-12 = 88 B	<input type="radio"/> Reduce 16 B	You : 140-16 = 124 B (1): 100-48 = 52 B
<input type="radio"/> Reduce 6 B	You : 140-6 = 134 B (1): 100-18 = 82 B	<input type="radio"/> Reduce 18 B	You : 140-18 = 122 B (1): 100-54 = 46 B
<input type="radio"/> Reduce 8 B	You : 140-8 = 132 B (1): 100-24 = 76 B	<input type="radio"/> Reduce 20 B	You : 140-20 = 120 B (1): 100-60 = 40 B
<input type="radio"/> Reduce 10 B	You : 140-10 = 130 B (1): 100-30 = 70 B		

## Example 1

### Example 1

Stage1: No-hat 1 and No-hat 2 keep the endowment.  
 Stage 2: Hat 1 uses 10 Baht to reduce No-hat 1's payoff.  
 and Hat 2 uses 20 Baht to reduce No-hat 2's payoff.

Calculation of the payoffs of all participants in steps

- Hat 1:  $140 - 10 = 130$  Baht
- No-hat 1:  $40$  (stage 1) +  $20$  (stage 2) -  $10 \times 3 = 60 - 30 = 30$  Baht
- Hat 2:  $140 - 20 = 120$  Baht
- No-hat 2:  $40 + 20 - 20 \times 3 = 60 - 60 = 0$  Baht

### Decision for case 1

You can reduce Person 1's payoff by reducing your own payoff. Please choose the option you like the most, only 1 option.

Case 1:  $40+20=60$  Baht     $40+20=60$  Baht

<input type="radio"/> Reduce 0 B	You : 140 B (1): 60 B	<input type="radio"/> Reduce 12 B	You : 140-12 = 128 B (1): 60-36 = 24 B
<input type="radio"/> Reduce 2 B	You : 140-2 = 138 B (1): 60-6 = 54 B	<input type="radio"/> Reduce 14 B	You : 140-14 = 126 B (1): 60-42 = 18 B
<input type="radio"/> Reduce 4 B	You : 140-4 = 136 B (1): 60-12 = 48 B	<input type="radio"/> Reduce 16 B	You : 140-16 = 124 B (1): 60-48 = 12 B
<input type="radio"/> Reduce 6 B	You : 140-6 = 134 B (1): 60-18 = 42 B	<input type="radio"/> Reduce 18 B	You : 140-18 = 122 B (1): 60-54 = 6 B
<input type="radio"/> Reduce 8 B	You : 140-8 = 132 B (1): 60-24 = 36 B	<input type="radio"/> Reduce 20 B	You : 140-20 = 120 B (1): 60-60 = 0 B
<input type="radio"/> Reduce 10 B	You : 140-10 = 130 B (1): 60-30 = 30 B		

## Example 2

### Example 2

Stage1: No-hat 1 and No-hat 2 keep the endowment  
 Stage 2: Hat 1 and Hat 2 do not reduce their payoffs to reduce No-hats' payoffs

Calculation of the payoffs of all participants in steps

- Hat 1:  $140 - 0 = 140$  Baht
- No-hat 1:  $80$  (stage 1) +  $20$  (stage 2) -  $0 = 100$  Baht
- Hat 2:  $140 - 0 = 140$  Baht
- No-hat 2:  $80 + 22 - 0 = 100$  Baht

### Decision for case 4

You can reduce Person 1's payoff by reducing your own payoff. Please choose the option you like the most, only 1 option.

Case 4:  $80+20=100$  Baht     $80+20=100$  Baht

<input type="radio"/> Reduce 0 B	You : 140 B (1): 100 B	<input type="radio"/> Reduce 12 B	You : 140-12 = 128 B (1): 100-36 = 64 B
<input type="radio"/> Reduce 2 B	You : 140-2 = 138 B (1): 100-6 = 94 B	<input type="radio"/> Reduce 14 B	You : 140-14 = 126 B (1): 100-42 = 58 B
<input type="radio"/> Reduce 4 B	You : 140-4 = 136 B (1): 100-12 = 88 B	<input type="radio"/> Reduce 16 B	You : 140-16 = 124 B (1): 100-48 = 52 B
<input type="radio"/> Reduce 6 B	You : 140-6 = 134 B (1): 100-18 = 82 B	<input type="radio"/> Reduce 18 B	You : 140-18 = 122 B (1): 100-54 = 46 B
<input type="radio"/> Reduce 8 B	You : 140-8 = 132 B (1): 100-24 = 76 B	<input type="radio"/> Reduce 20 B	You : 140-20 = 120 B (1): 100-60 = 40 B
<input type="radio"/> Reduce 10 B	You : 140-10 = 130 B (1): 100-30 = 70 B		

**Do you understand?**

- Please answer the following questions to see whether you really understand this activity.
- See the scenario sheet for stage 1 and the reduction table for stage 2.
- If you have any question, please raise your hand and we will come to you.
- *(Distribute the test questions)*

**Test questions**

**Test Question 1**

Stage 1: Person 1 and Person 2 keep the endowment.  
 Stage 2: Hat 1 reduce her own payoff for 10 Baht to reduce No-hat 1's payoff.  
 What are the payoffs of Hat 1 and No-hat 1?

- Hat 1: ..... Baht
- No-hat 1: ..... Baht

**Test Question 2**

Stage 1: Person 1 keeps the endowment but Person 2 passes it.  
 Stage 2: Hat 1 reduce her own payoff for 20 Baht to reduce No-hat 1's payoff.  
 What are the payoffs of Hat 1 and Person 1?

- Hat 1: ..... Baht
- Person 1: ..... Baht

**Test Question 3**

Stage 1: No-hat 1 and No-hat 2 pass the endowment  
 Stage 2: Hat 1 and Hat 2 do not reduce Persons' payoffs  
 What are the payoffs of Hat 1 and No-hat 1?

- Hat 1: ..... Baht
- No-hat 1: ..... Baht

**Test Question 4**

Stage 1: Person 1 keeps the endowment but Person 2 passes it.  
 Stage 2: Hat 1 reduce her own payoff for 8 Baht to reduce No-hat 1's payoff.  
 What are the payoffs of Hat 1 and Person 1?

- Hat 1: ..... Baht
- Person 1: ..... Baht

*(collect the test questions)*

**Involved people**

- You will be randomly matched with either participants from your village or from another village.
- You will see on your answer sheet whether you are matched with a person from your village or from another village.
- Participants from your village will have the same color as yours (black).
- Participants from another village will have another color (white).

## Summary

- The payoff from this activity depends on your and others' decisions.
- You will be re-matched with other participants than from the previous activity.
- No-hat 1 decides in stage 1 to keep or pass the endowment and will get this only one answer sheet (*show the answer sheets for stage 1, only the first two in in-in, in-out treatment and the last two in out-in and out-out treatment*).
- Hat 1 decides in stage 2 how much to reduce to be able to reduce No-hat's payoff and will get these 4 answer sheets (*show the answer sheets for stage 2*).

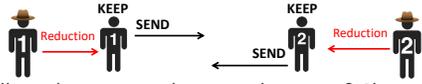
## Sample answer sheet

You will get one of these. (*Show sample answer sheets*).

Possible answer sheets of No-hat 1:

**Sample answer sheet** 

- Remember, you are  / Your match  is from your village.
- You will be observed by  from your village.
- Your match  is observed by  from your village.

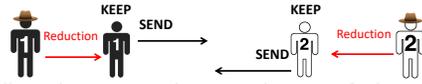


- Will you keep or send your endowment? Choose your answer.

<input type="radio"/> KEEP	<input type="radio"/> SEND
----------------------------	----------------------------

**Sample answer sheet** 

- Remember, you are  / Your match  is from another village.
- You will be observed by  from your village.
- Your match  is observed by  from another village.

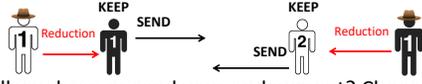


- Will you keep or send your endowment? Choose your answer.

<input type="radio"/> KEEP	<input type="radio"/> SEND
----------------------------	----------------------------

**Sample answer sheet** 

- Remember, you are  / Your match  is from another village.
- You will be observed by  from another village.
- Your match  is observed by  from your village.

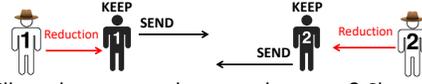


- Will you keep or send your endowment? Choose your answer.

<input type="radio"/> KEEP	<input type="radio"/> SEND
----------------------------	----------------------------

**Sample answer sheet** 

- Remember, you are  / Your match  is from your village.
- You will be observed by  from another village.
- Your match  is observed by  from your village.



- Will you keep or send your endowment? Choose your answer.

<input type="radio"/> KEEP	<input type="radio"/> SEND
----------------------------	----------------------------

**Distribute the answer sheets.**

**Done?**

- Please write down your cubicle number on the upper right corner.
- If you are done, please close the folder.

- Please wait quietly until we continue with the next activity.
- Please stay quiet when you are done. Otherwise others could guess who is Hats or No-hats.

### Activity 3

#### Situation

- In this activity, you will be re-matched with other participants than in the previous activities.
- You will not know the identity of your match.
- In each pair, there are “Person 1” and “Person 2”.
- You will be randomly assigned a role of “Person 1” or “Person 2”.
- Only “Person 1” receives the endowment of 100 Baht.

#### The Payoff (*Use the magnet board*)

- Only “Person 1” receives the endowment of 100 Baht.
- “Person 1” has to decide how much (out of 100 Baht) to give “Person 2”.
- The rest is the amount that “Person 1” will keep.
- Example 1: If “Person 1” gives 40 Baht to “Person 2”, “Person 2” will get 40 Baht, while “Person 1” will get  $100 - 40 = 60$  Baht.
- Example 2: If “Person 1” gives 20 Baht to “Person 2”, “Person 2” will get 20 Baht, while “Person 1” will get  $100 - 20 = 80$  Baht.

#### Do you understand?

- If you have any question, please raise your hand and we will come to you.
- Please answer the following questions to see whether you really understand this activity.
- (*Distribute test questions*).

#### Test questions

**Test Question 1**

- “Person 1” receives the endowment of 100 Baht.
- If “Person 1” gives 50 Baht to “Person 2”, how much will “Person 2” and “Person 1” get?
  - “Person 2” will get 50 Baht.
  - “Person 1” will get  $100 - 50 = 50$  Baht.

**Test Question 2**

- “Person 1” receives the endowment of 100 Baht.
- If “Person 1” gives 70 Baht to “Person 2”, how much will “Person 2” and “Person 1” get?
  - “Person 2” will get 70 Baht.
  - “Person 1” will get  $100 - 70 = 30$  Baht.
- (*collect test questions*)

**Your decisions**

- Now everybody please decide as the “Person 1”.
- Please write down in your answer sheet how much to give to your randomly assigned “Person 2”.
- Again, you will be randomly matched with either a participant from your village or from another village.
- You will see on your answer sheet whether your “Person 2” is from your village or from another village.
- “Person 2” from your village will have the same color as yours (black).
- “Person 2” from another village will have another color (white).

**Your actual role**

- After all of you have made the decision, you will be randomly assigned a role of “Person 1” or “Person 2”.
- We will tell you what role you have and how much you earn in this activity at the end of today’s activities.

**Distribute the answer sheet.****Done?**

- Please write down your cubicle number on the upper right corner.
- If you are done, please close the folder.
- Please wait quietly until the we move to the next activity.

**Activity 4 (Cheating experiment for Boonmanunt et al. 2019)**

...

**All decision activities are done.**

We have finished all four decision activities. You are doing great. Now please let us interview you one-by-one, while the researchers outside are preparing the payment for you. For answering this questionnaire, you will get 100 Baht in addition. Please wait until the interviewer comes to you. When the interview is done, please wait until you are called out to get your payment. We will inform you about the results of all activities in private as well. Thank you very much for your participation and attention.

## Appendix D: Post-experiment Questionnaire

<b>Questionnaire</b>		
Date: December ....., 2017	<input type="checkbox"/> 1. Morning	<input type="checkbox"/> 2. Afternoon
ID number .....	<input type="checkbox"/> Team 1	<input type="checkbox"/> Team 2
Interviewer .....		
Checker .....		

Please make a tick in the  that you agree with

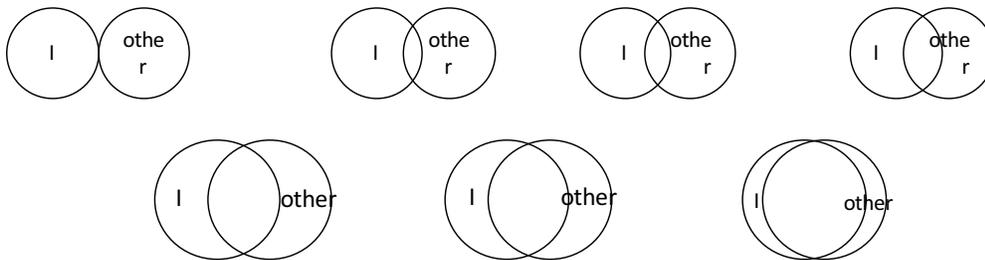
1. All things considered, how satisfied are you with your life as a whole these days?

<input type="checkbox"/>									
1	2	3	4	5	6	7	8	9	10
very unsatisfied								very satisfied	

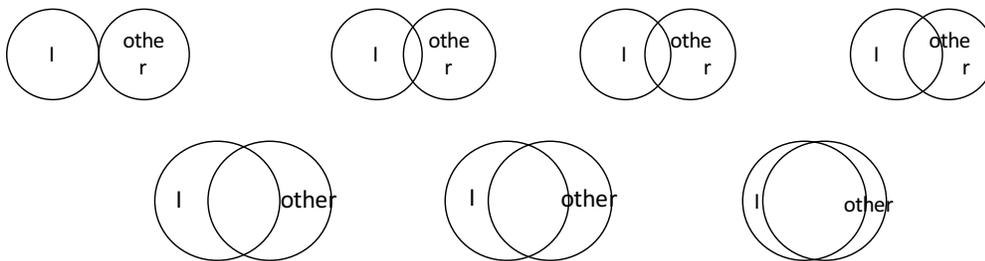
2. Think about the first activity, you have to choose between keep or send your endowment to your random match. As you were making the decision, what did you think your match will do?

0. Keep                       1. Send

3. Please circle the picture that best describes your current relationship with an average person from your village.



4. Please circle the picture that best describes your current relationship with an average person from another village.



5. All things considered, would you say that most people can be trusted or that you need to be very careful in dealing with people? (Choose one answer)

0. Need to be very careful

1. Most people can be trusted

6. Do you think that other people only have the best intentions?

0      1      2      3      4      5      6      7      8      9      10

do not agree at all

agree perfectly

7. How willing would you be to give to good causes without expecting anything in return?

0      1      2      3      4      5      6      7      8      9      10

completely unwilling

very willing

8. Are you a person who is generally willing to take risks, or do you try to avoid taking risks?

0      1      2      3      4      5      6      7      8      9      10

completely unwilling

very willing

9. Are you generally an impatient person, or someone who always shows great patience?

Please use a scale from 0 to 10, where a 0 means you are “very impatient” and a 10 means you are “very patient”.

0      1      2      3      4      5      6      7      8      9      10

completely unwilling

very willing

10. Are you a person who is generally willing to give up something that is beneficial for you today in order to benefit more from that in the future or are you not willing to do so?

0      1      2      3      4      5      6      7      8      9      10

completely unwilling

very willing



<b>Expenditure</b>	<b>Month of expenditure</b>	<b>Baht (Total) in that month</b>
1) Plowing the field		
2) Young plants (if any)		
3) Planing (if any)		
4) Herbicide/Pesticide (if any)		
5) Chemical fertilizer (if any)		
6) Organic fertilizer (if any)		
7) Rent (if any)		
8) Harvesting		
9) Others, specify .....		
<b>Total</b>		

18. How many Rai do you plant .....? ... Rai. Owned ... Rai, rented ... Rai, public ... Rai.

19. Expenditure for ..... farming

<b>Expenditure</b>	<b>Month of expenditure</b>	<b>Baht (Total) in that month</b>
1) Plowing the field		
2) Young plants (if any)		
3) Planing (if any)		
4) Herbicide/Pesticide (if any)		
5) Chemical fertilizer (if any)		
6) Organic fertilizer (if any)		
7) Rent (if any)		
8) Harvesting		
9) Others, specify .....		
<b>Total</b>		

20. Monthly “basic” household expenditure

<b>Expenditure</b>	<b>Baht/Month</b>
1) Rent/Montage	
2) Water	
3) Electricity	
4) Telephone/internet/mobile phone	
5) Food	
6) Transportation	

7) Consumption goods (e.g. soap, shampoo, detergent)	
8) School fee for family members	
9) Cigarette/tobacco & alcohol	
10) Parties/celebrations	
11) Merit/donations	
12) Cloths/cosmetics/decorations	
13) Installment for vehicles or electronic machines	
14) Lottery/Gambling	
15) Others, specify .....	
<b>Total</b>	

21. Household income around the year

Item	Month of the income	Amount in that particular month	Is it an estimation?
1. Rice			
2. Plant 1 .....			
3. Plant 2 .....			
4. Livestock 1 .....			
5. Livestock 2 .....			
6. Regular work .....			
7. Wage labor			
8. Transfer from family members (who work outside the village)			
9. Government transfer for old people			
10. Government transfer for poor people			
11. Other .....			
12. Other .....			

22. Which months are usually the best in terms of net income for you? (the first three months)

1. .... 2. .... 3. ....

No difference

23. Which months are usually the most difficult in terms of net income for you? (the first three months)

1. .... 2. .... 3. ....

No difference

24. Which months are usually the best in terms of food for you? (the first three months)

1. .... 2. .... 3. ....

No difference

25. Which months are usually the most difficult in terms of food for you? (the first three months)

1. .... 2. .... 3. ....

No difference

26. Does any adult in the household currently have a loan?

0. No (Go to 30)

1. Yes

27 How much does your household borrow from your friends and relatives? .... Baht.

28 How much loan does your household have? ..... Baht.

29. In a year, in which months do you get a loan, pay interest and repay the loan? Do you have difficulties paying them in those particular months? (Tick in the table below)

Month	Loan receipt?	Interest paid?	Loan repaid?	Difficulties with payment?
April				
May				
June				
July				
August				
September				
October				
November				
December				
January				
February				
March				

30. In the last month has the household been negatively affected by any of the following problems?

- 1. Unusually high level of **crop pests and diseases**
- 2. Unusually high level of **livestock diseases**
- 3. Death or illness of **main earner** in the household (please choose): Loss of income / Medical expenses (please specify)
- 4. Death or illness of **other earners** in the household (please choose): Loss of income / Medical expenses (please specify)
- 5. Loss of productive or consumption assets / livestock / crops due to **flood**
- 6. Loss of productive or consumption assets / livestock / crops due to **theft**
- 7. Loss of productive or consumption assets / livestock / crops due to **fire**

31. Do you currently have any savings?

- 0. No (Go to 33)
- 1. Yes

32. Where do you save?

- 1. At home
- 2. Bank
- 3. Savings groups/cooperatives
- 4. Insurance company
- 5. Gold
- 6. Livestock (cows / buffalos)
- 7. ROSCAs
- 8. Savings programs for retirement
- 9. Cremation group
- 10. Others, specify .....

33. Does your family live in your own house on your own land?

- 0. No
- 1. Yes, we live in our own house in our own land

34. Have you lived in this village since you were born?

- 0. No
- 1. Yes

35. How acceptable is it to cheat for one's own private benefit?

- |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
| 1                        | 2                        | 3                        | 4                        | 5                        | 6                        | 7                        | 8                        | 9                        | 10                       |
| very unacceptable        |                          |                          |                          |                          | very acceptable          |                          |                          |                          |                          |

36. In the last month, how often have you felt that you were unable to control the important things in your life?

<input type="checkbox"/>				
1	2	3	4	5
Never	Almost never	Sometimes	Fairly often	Very often

37. In the last month, how often have you felt confident about your ability to handle your personal problems?

<input type="checkbox"/>				
1	2	3	4	5
Never	Almost never	Sometimes	Fairly often	Very often

38. In the last month, how often have you felt that things were going your way?

<input type="checkbox"/>				
1	2	3	4	5
Never	Almost never	Sometimes	Fairly often	Very often

39. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

<input type="checkbox"/>				
1	2	3	4	5
Never	Almost never	Sometimes	Fairly often	Very often

40. Gender:            0. Male    1. Female

41. Age: ..... years old

42. Marriage status:    0. Single    1. Married    2. Divorced / Widow

43. Children: .....

44. How many members are there in your family? .....

45. Amount of members who are working .....

46. Your degree of education

- |   |  |
|---|--|
| <input type="checkbox"/> 1.No School                      | <input type="checkbox"/> 2.Primary school (level)..... |
| <input type="checkbox"/> 3.Secondary school (level) ..... | <input type="checkbox"/> 4.Diploma (level) .....       |
| <input type="checkbox"/> 5.Bachelor degree (level) .....  | <input type="checkbox"/> 6.Higher than Bachelor degree |

47. Main occupation (select one choice)

- |  |  |
|--|--|
| <input type="checkbox"/> 1.Rice farmer           | <input type="checkbox"/> 2.Farmer, specify ..... |
| <input type="checkbox"/> 3.Wageworker            | <input type="checkbox"/> 4.Government officer    |
| <input type="checkbox"/> 5.Company employee      | <input type="checkbox"/> 6.Business owner        |
| <input type="checkbox"/> 7.Others, specify ..... |  |

48. Supplemental occupation (select all that apply)

- |  |  |
|--|--|
| <input type="checkbox"/> 1.Rice farmer             | <input type="checkbox"/> 2.Farmer, specify .....     |
| <input type="checkbox"/> 3.Wageworker              | <input type="checkbox"/> 4.Livestocks, specify ..... |
| <input type="checkbox"/> 5.Government officer      | <input type="checkbox"/> 6.Company employer          |
| <input type="checkbox"/> 7.Public health volunteer | <input type="checkbox"/> 8.Others, specify .....     |

49. Are you a community leader, e.g. village headman, assistant headman, savings group committee, informal leader, etc.?

0. No                       1 Yes

50. Are you a member of any of these following groups? (*Only after-harvest sessions*)

- |  |  |
|--|--|
| <input type="checkbox"/> 0.No  |  |
| <input type="checkbox"/> 1.Savings group / Cooperatives              | <input type="checkbox"/> 2.Cremation group       |
| <input type="checkbox"/> 3.Female occupational group                 | <input type="checkbox"/> 4.Organic farming group |
| <input type="checkbox"/> 5.Volunteering group in development project | <input type="checkbox"/> 6.Scouts                |
| <input type="checkbox"/> 7.Resource conservation group               | <input type="checkbox"/> 8.Others, specify ..... |

51. Could we contact you in case we have further questions?

0. No                       1 Yes, mobile number .....

**Thank you very much for participating in this survey**

**Appendix E: Regressions of Decisions in PD and PD with Punishment with Interaction Term Between In-Group Status of Partner and Harvest Timing**

Table A6: Regressions of decisions in PD and PD with punishment with interaction term between in-group status of partner and harvest timing

Dependent Variable:	Cooperation (Send in Prisoner's dilemma)		Punishment on defectors in PD with punishment	
Specification:	Logit		OLS	
Model:	(I)	(II)	(III)	(IV)
In-group (dummy)	0.08 (0.06)	0.07 (0.06)	-0.63 (0.86)	-0.82 (0.86)
After-harvest (dummy)	-0.01 (0.06)	0.01 (0.07)	1.00 (0.91)	0.93 (0.95)
In-group*After-harvest	0.07 (0.09)	0.06 (0.09)	-1.70 (1.16)	-1.56 (1.22)
Age		-0.005* (0.003)		-0.006 (0.04)
Female		-0.04 (0.06)		-0.34 (0.76)
Education (Years in school)		0.01 (0.01)		0.03 (0.13)
In debt (dummy)		0.08 (0.07)		-1.69 (1.03)
Sold rice this year (dummy)		0.12** (0.05)		-0.49 (0.65)
Sharing (Dictator game)		0.01*** (0.002)		-0.02 (0.01)
Trust level		0.01 (0.01)		
Risk level		-0.003 (0.003)		
Constant			4.36*** (0.67)	7.35** (3.16)
Observations	558	558	552	552
Individuals	558	558	276	276

*Notes:* Logit models present marginal effects. Trust level ranges from 1–10 for the question “Do you think that other people only have the best intentions?” Risk level ranges from 0–10 from the question “Are you a person who is generally willing to take risks, or do you try to avoid taking risks?” Robust standard errors are clustered by individual in parentheses. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01.

