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195

**Prosocial Behavior, Social Interaction and Development:
Experimental Evidence from Vietnam**

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Phạm Khánh Nam

Göteborg, February 2011.

Abstract

The thesis consists of five self-contained papers.

Paper 1. Funding a New Bridge in Rural Vietnam: A Field Experiment on Conditional Cooperation and Default Contributions

The ability to provide public goods is essential for economic and social development, yet there is very limited empirical evidence regarding contributions to a real local public good in developing countries. This paper analyzes a field experiment where 200 households in rural Vietnam could make real contributions to an archetypical public good, a bridge. In particular, we study the role of two kinds of social influence: *i*) conditional cooperation, i.e., that people may be more willing to cooperate if others do, and *ii*) the effects of the default alternative, i.e., that people are influenced by the default alternative presented to them in the choice situation. We find significant and substantial effects of both kinds of influence. For example, by either giving the subjects the additional information that one of the most common contributions by others is 100,000 dong (a relatively low contribution) or introducing a zero-contribution default alternative, the average contribution decreases by about 20% compared to the baseline case.

Paper 2. Are Social Preferences Stable over Time?

We use a combination of two natural experiments and one field experiment to measure people's prosocial behavior in terms of voluntary money and labor time contributions to an archetypical public good – a bridge – in rural Vietnam, at three different points in time from 2005 to 2010. Since the experiments are far apart in time, potentially confounding effects of moral licensing and moral cleansing are presumably small, if at all existent. We find a strong positive and statistically significant correlation between voluntary contributions in these experiments, whether correcting for other covariates or not. This result suggests that prosocial preferences are at least partly stable over long periods of time.

Paper 3. Conditional Cooperation and Disclosure in Developing Countries

Understanding the patterns behind people's voluntary contributions to public goods is crucial for the broader issues of economic and social development. By using the experimental design by Fischbacher *et al.* (2001), we investigate distributions of contribution types in developing countries (Colombia and Vietnam) and compare our findings with those previously found in

developed countries. We also investigate the effect of introducing disclosure of contribution. Our experiments show that, on average, the distributions of contribution types are similar both in the two countries and compared to previous findings, except for free-riders, and overall remain unaffected by disclosure of contributions.

Paper 4. Social Capital and Private Adaptation to Climate Change: Evidence from the Mekong River Delta in Vietnam

Farmers in developing countries often face capital constraints in adapting to climate change. Can farmers' own social capital be utilized to facilitate the adaptation? This study uses four components of social capital – formal institutions, informal institutions, trust, and cooperativeness – to examine whether social capital is systematically linked to adaptation to climate change. The results suggest, in general, that social capital at the individual level does not affect farmers' private adaptation to climate change. Yet, some forms of social capital are significantly associated with the choice of some particular adaptation measures.

Paper 5. Are Vietnamese Farmers Concerned with their Relative Position in Society?

This paper examines the attitude towards relative position or status among rural households in Vietnam. On average, respondents show rather weak preferences for relative position. Possible explanations are the emphasis on the importance of equality and that villagers are very concerned with how the local community perceives their actions. We also investigate what influences the concern for relative position and find, among other things, that if anyone from the household is a member of the Peoples Committee then the respondent is more concerned with the relative position.

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Introduction

In a farming village in the Mekong River Delta in Vietnam, villagers together and voluntarily contributed money and labor to build a concrete bridge, a public good that everyone can use irrespective of whether or not they contributed to build it. Standard economic theory predicts no bridge; people tend to free ride on the effort of others, therefore no one is willing to pay for the public good. The bridge, in reality, was built. Villagers were able to cooperate to overcome the social dilemmas.

In developed countries, the social dilemmas, in which individual incentives are at odd with group incentives, are often surmounted by effective formal institutions. In many developing countries, where formal institutions are luxury goods, people rely on informal institutions and local norms, such as labor groups and norms of trust and reciprocity, to build bridges, to dredge irrigation canals, to plant trees or to regulate fishing areas. To foster development, society should design policies and incentives basing on the insights on how people behave within the institutions and norms. Economists' findings on how individual preferences work and interact with each other and with institutions might help policy makers with suitable ways of how to nudge for development. As Cardenas and Carpenter (2008) pointed out, although a plenty of economic experiments has been done in developing communities, there is limited empirical evidence regarding the determinants, stability, and implications of prosocial behavior and social interaction. In this thesis, we attempt to fill this void by investigating the existence, pattern, stability and implications of social preferences and social interaction.

This five-paper thesis consists of economic experiments that investigate the individual preferences, specifically social preferences, and social interaction of Vietnamese. The first paper examines the role of social influence in voluntary contributions to public goods. The second paper tests whether the cooperative preferences stable over long periods of time. The third paper examines the distribution of cooperative-preferences types in Colombia and Vietnam and compares it with the distributions found in other countries. The fourth paper investigates the role of farmers' social capital in the adaptation to climate change. And the last paper measures the farmers' preferences for relative position.

The first focus of the thesis is about how institutions affect cooperative behavior. Elinor Ostrom and co-authors have carefully investigated the effects of different institutional settings for the abilities of local societies, in particular in developing countries, to effectively handle

social dilemma-type situations; see e.g. Ostrom (1990). Yet, little has been done in this area regarding the direct effects of social influence on individuals' behavior. Such effects have instead been carefully analyzed in the rapidly growing literature on charitable giving (see, e.g., Soetevent, 2005; Landry et al., 2006; Alpizar et al. 2008; Shang and Croson, 2009; Soetevent, 2011). However, the extent to which these insights are transferable to the issue of contribution to real public goods, i.e. strategic interaction settings, in a developing country context is far from obvious. In the first paper, using a threshold public good experiment in a natural setting, we examine two types of social influence: *i*) conditional cooperation, i.e., that people may be more willing to cooperate if others cooperate, and *ii*) the effects of a default alternative, i.e., that people are often found to be influenced by a default alternative presented to them in the choice situation (see, e.g., Thaler and Sunstein, 2008). We find significant and substantial effects of both kinds of social influence. For example, by either giving the subjects the additional information that one of the most common contributions by others is 100,000 dong (a relatively low contribution), or by introducing a zero contribution default alternative, the average contribution decreases by about 20% compared to the baseline case.

The first paper confirms that good institutions can provoke cooperative preferences in order to sustain and support collective action; subsequently, a natural question arises: whether the cooperative preferences, or social preferences in a broader sense, are stable. If the preferences are unstable over time, our nudges becomes likewise unstable and hence ineffective. Indeed, that people's prosocial actions vary over time is obvious since most of us sometimes contribute to a certain charity and sometimes we do not. Yet, how much of the observed heterogeneity in social preferences that can be explained by within-people variations is not clear, nor is it clear whether an individual who acted cooperatively in one moment in time is significantly more likely to act cooperatively in a similar task several years later. When testing for stability of cooperative preferences, we have possible confounding effects: the moral licensing – people who have undertaken a praiseworthy action get an implicit license for subsequently conducting a more selfish act; or the moral cleansing – the compensatory behavior when people's moral self-worth has been threatened, for example Gneezy and Imas (2010) found that people who lied or did not return money they received by mistake were more likely than others to donate to charity. One approach to disentangle the confounding effects would be to set up the tests with a large time in between, so that moral licensing and moral cleansing effects can be ignored. In the second paper, we test the stability of cooperative preferences using a combination of two natural experiments and one field

experiment, all referring building a real bridge in rural Vietnam, in time ranging from 2005 to 2010 – possibly sufficient to avoid the potentially confounding factors due to moral licensing and moral cleansing. We find a strong positive and statistically significant correlation between voluntary contributions at these experiments, suggesting prosocial behaviors are at least partly stable over long periods of time.

While the cooperative preferences appear stable over time, the question to what extent the pattern behind cooperative preferences is stable across developed and developing countries has not been addressed. Recent research finds that people differ strongly in their cooperative preferences – there were large heterogeneity in contributions among people ranging from free-riders to people who contribute fully to a public good. Free-riders and conditional cooperators are the two dominating types and on average free-riders normally make up approximately one-quarter of the population, while the conditional cooperators approximately half of the population (e.g. Fischbacher *et al.*, 2001; Kocher *et al.*, 2008; Herrmann and Thöni, 2009; Fischbacher and Gächter, 2010). Insights on the contributor types appear important for governance practices. Gächter and Thöni (2005) find that in homogenous groups, i.e. groups of conditional cooperators, social norms of cooperation sustain better than in heterogeneous groups. Findings on contributor type, however, have been largely based on Western or developed countries. Are distributions of contributor's types similar or different across countries? In the third paper, we investigate the distributions of contribution types in developing countries, Colombia and Vietnam, and compare our findings to those previously found in developed countries. We also investigate the effect of introducing disclosures of contribution on contribution types. Our standard public goods experiments using the strategy method show that, on average, the distributions of contribution types are similar both in the two countries and compared to previous findings, except for free-riders, and overall remain unaffected by disclosure of contributions.

Apart from other papers, which examine people's prosocial behavior and how people behave within institutions, the fourth paper relates social aspects of individual i.e. social capital to a development issue – adaptation to climate change in Vietnam. Chinvarno *et al.* (2008) report that in order to cope with the impacts of climate change, rice farmers in the Mekong River Delta in Vietnam have mainly used their own household resources and have concentrated their adaptation actions within their farm boundaries. Faced with limited financial capability, instead of investing in costly defensive efforts such as small scale irrigation, farming households have used alternative adaptation strategies such as adjusting

the crop calendar or using alternative crops and seed varieties. Studies on to what extent social capital determines households' choice of these adaptation measures may have distinct policy relevance since available resources such as social capital can be used up given chronic problems of human and financial resource constraints. In the fourth paper, we construct a set of social capital indexes that cover formal and informal social networks, trust, and cooperativeness. The first three social capital indexes are based on survey responses. The measure of cooperativeness is based on actual behavior of farmers in the public good experiment presented in the first paper. We then examine how these social capital indexes are associated with farmers' choice of private adaptation to climate change. We find that, in general, social capital at the individual level does not affect farmers' behavior with respect to private adaptation. Some forms of social capital such as formal and informal institutions, however, are weakly associated with the choice of different climate change adaptation measures in farming activities.

In the last paper we investigate farmer's preferences towards relative status in Vietnam using a survey-based experiment. We asked respondents to make repeated choices between two alternatives, each alternative has different own income and income of the average person in the village. This information allows us to measure the degree of positionality using the additive comparison utility function. We find that farmers are not particularly concerned over their relative position and that the mean degrees of positionality are lower than those found in comparable studies conducted in Western countries.

This thesis uses surveyed-based, lab, field and natural experiments, and household survey to investigate the existence, pattern, stability and implications of social preferences and social interaction in Vietnam. The thesis suggests that information and the choice contexts are important determinants of the cooperative preferences. Although context-dependent, the cooperative preferences are partly stable over time, and its main pattern, i.e. the share of conditional cooperator, is stable across countries. After all, set aside academic results, the thesis project team, in cooperating with the villagers in Giong Trom, have successfully built a new concrete bridge for the village.

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Paper I

Funding a New Bridge in Rural Vietnam: A Field Experiment on Conditional Cooperation and Default Contributions

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Abstract

The ability to provide public goods is essential for economic and social development, yet there is very limited empirical evidence regarding contributions to a real local public good in developing countries. This paper analyzes a field experiment where 200 households in rural Vietnam could make real contributions to an archetypical public good, a bridge. In particular, we study the role of two kinds of social influence: *i*) conditional cooperation, i.e., that people may be more willing to cooperate if others do, and *ii*) the effects of the default alternative, i.e., that people are influenced by the default alternative presented to them in the choice situation. We find significant and substantial effects of both kinds of influence. For example, by either giving the subjects the additional information that one of the most common contributions by others is 100,000 dong (a relatively low contribution) or introducing a zero-contribution default alternative, the average contribution decreases by about 20% compared to the baseline case.

JEL-classification: C93; Q50

Key words: voluntary contribution; local public goods; social influence; default contribution, conditional cooperation; field experiment.

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1. Introduction

The ability to handle social dilemma-type situations, such as providing an adequate amount of public goods, and the corresponding free-rider problems is crucial for economic and social development (Hall and Jones, 1999; La Porta et al., 1999; Ostrom, 2009). In the present paper, we analyze experimentally the role of social influence, in terms of modified information about others' contribution and provision of default alternatives, for real contributions to an archetypical public good, a bridge (cf. Dupuit, 1844), in rural Vietnam. We conducted a field experiment designed as a threshold public good experiment. The subjects, consisting of the household heads of all households in the village, were asked to make voluntary contributions for the construction of a bridge in their village. If a sufficient amount of money was contributed by the village members, the bridge would be built.

Most poor countries have weak or badly functioning governments, meaning that a large share of public goods have to be provided privately with the help of local institutions and mechanisms. Elinor Ostrom and co-authors have carefully analyzed the effects of different institutional settings for the abilities of local societies, in particular in developing countries, to effectively handle social dilemma-type situations; see, e.g., Dietz et al. (2003), Ostrom (1990, 2009), and Ostrom et al. (1992). Yet, little has been done in this area regarding the direct effects of social influence on individuals' behavior. Such effects have instead been carefully analyzed in the rapidly growing literature on charitable giving (see, e.g., List and Lucking-Riley, 2002; Landry et al., 2006; Shang and Croson, 2009; Alpizar and Martinsson, 2010; Soetevent, 2011). However, the extent to which these insights are transferable to the issue of contribution to real public goods in a developing country context is far from obvious. First, the charitable giving literature has primarily focused on relatively rich people's contribution, implying for example that the contributions have typically been small relative to the subjects' income. Second, the subjects' direct benefit of the good provided by the charity has typically been negligible, except for the warm glow effects of contributing to a good cause (cf. Andreoni, 1989, 1990).

In the present paper, we focus on two types of social influence: *i*) conditional cooperation, i.e., that people may be more willing to cooperate if others cooperate (see, e.g., Gächter, 2007), and *ii*) the effects of a default alternative, i.e., that people are often found to be influenced by a default alternative presented to them in the choice situation (see, e.g., Thaler and Sunstein, 2008). To find out whether and to what extent these kinds of social

influence matter for people's voluntary contributions to local public goods is important from a policy perspective. For example, the choice of frame for a particular policy implementation can be modified to some extent by aid organizations, NGOs, and local decision makers at the village level.

Many experimental results can be interpreted in terms of conditional cooperation. For example, Fischbacher et al. (2001) found, based on the strategy method, that about 50% of the subjects increase their contribution in a one-shot public good game if others do so as well. Fischbacher and Gächter (2010) concluded that conditional cooperation appears to be the main reason behind the typically observed pattern of decreasing cooperation rates in repeated public goods games. For our purpose, evidence from the field is particularly interesting. Frey and Meier (2004) analyzed the behavior of students in Zurich who had the opportunity to contribute to two social funds every semester. The contributions were higher when they were informed that many other students were contributing, although the effect was not statistically significant. In a field-experimental setting, Alpizar et al. (2008) investigated people's voluntary contribution to a natural park. When the subjects were told that the typical contribution of others was \$2 (a small contribution), the probability of a contribution increased and the conditional contribution decreased, compared with no provision of reference information. Providing a high reference level (\$10) increased the conditional contribution, whereas the probability of contribution remained unaffected. The overall effects of the reference information were quite modest. Shang and Croson (2009) investigated how information about a typical contribution to a radio station affects subject contributions and found that the highest reference amount (\$300) yielded a significantly higher contribution than no provision of any information. The direction for smaller amounts (\$75 and \$180) was the same, although not statistically significant.

There is also much empirical evidence that a default alternative matters for actual choices in many areas such as pension savings (Madrian and Shea, 2001; Choi et al., 2004; Cronqvist and Thaler, 2004), car insurance (Johnson et al., 1993), and health clubs (DellaVigna and Malmendier, 2006). With respect to pro-social behavior, Johnson and Goldstein (2003) compared countries with different organ donation rules and found that countries where people by default *are not* donors, i.e., people have to opt-in to become donors, had a significantly and substantially lower fraction of people donating compared to countries where people by default *are* donors, even though they had the same freedom of

choice in both cases.¹ Pichert and Katsikopoulou (2008) showed that “green” defaults could have significant effects on the choice of green electricity; when customers had to opt-out in order to buy non-green electricity many more customers bought green electricity. On the other hand, Löfgren et al. (2010) did not find any default effects on the choice of CO₂ offsets for air transport using a sample of experienced subjects.

Yet, as far as we know, no previous studies have tried to quantify the treatment effects of information about the contributions of others or of default alternatives on voluntary contributions to a real local public good – let alone in a developing country where this is presumably more important. This is the task of the present paper, of which the remainder is organized as follows: Section 2 provides the background of the Giong Trom village in rural Vietnam and its need for a new bridge. Section 3 presents the theoretical model, Section 4 the field-experimental design, and Section 5 the corresponding results. Finally, Section 6 concludes the paper.

2. The Village and the Need for a New Bridge

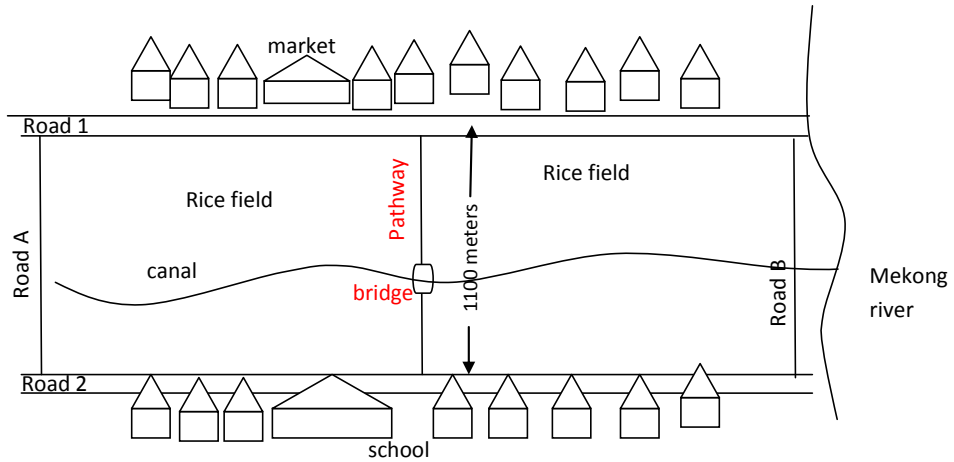
The field experiment was undertaken in Giong Trom village in the Mekong River Delta in Vietnam in 2009.² Most households in the village are engaged in rice cultivating activities. The village suffers one of the problems typical of the Mekong River Delta: the lack of a basic infrastructure such as rural roads, bridges, and irrigation canals. The government only provides larger public goods such as roads between villages. The small-scale infrastructure within a village is considered to be the responsibility of the village.

The field experiment concerns funding of a bridge for the village. At the time of the experiment, there was a wooden bridge about two meters wide and 14 meters long, made in 2005. People living along the two roads in the village used the pathway and the bridge to go through the rice fields (see Figure 1). Some villagers used the bridge to go to the market, visit friends, or go to schools if the bridge was in good condition. If they do not use the bridge, they have to use alternative routes, either road A or road B, which are located parallel to and about 1,200 meters from the bridge’s pathway; see the map in Figure 1. The wooden bridge was highly degraded and could not be used by tractors or motorbikes. In 2005, the households in this village actually contributed to build the bridge. Since the contributions were not

¹ However, it should be noted that there might be some endogeneity problems here, since the rules may in part reflect different donation attitudes among the countries.

² A village is a small commune or part of a commune and usually consists of 100-300 households.

enough for a concrete bridge, a wooden one was built. There are about 200 households on both sides of the bridge and they would all clearly benefit from a concrete bridge. All village households were included in our experiment.



The wooden bridge

Figure 1: Map and picture of the field situation

In order to build a new bridge, a sufficient amount of money had to be collected from the villagers. This is where the experiment comes in: We devised a threshold public good game, in which villagers received an endowment from us and had the option to either keep the money themselves or contribute some or everything to the funding of the bridge. The concrete bridge is a public good in the sense that irrespective of whether the participants wanted to contribute to the public account, they would have the right to use the bridge free of charge. Table 1 reports background statistics of the households.

Table 1. Household characteristics

Variables	Definition	Mean	Std. dev.
Household size	Number of household members	3.84	1.61
Age	Household head age; in years	49.0	13.8
Male	= 1 if male household head	0.62	
Education	1 = No schooling (5%); 2 = Grade 1-5 (53%); 3 = Grade 6 – 9 (32%); 4 = Grade 10 – 12 (9%); 5 = Vocational school (1%) for household head	2.47	0.77
Monthly income	Monthly household monetary income in hundred thousand dong	18.13	12.78
Uses the bridge daily ³	= 1if uses bridge every day	0.19	
Uses the bridge weekly	= 1 if uses bridge around 1 – 3 times a week	0.10	
Uses the bridge twice a month	= 1 if uses bridge around 2 times a month	0.17	
Uses the bridge once a month	= 1 if uses bridge around 1 time a month	0.30	
Cost of social events	Monthly expenditures for “social events,” e.g., weddings, and different kinds of ceremonies in hundred thousand dong	1.96	1.38
Member of the communist party	= 1 if at least one household member is a member of the communist party	0.10	
Association	= 1 if at least one household member is a member of a local association	0.49	
Punish	How likely is it that people who do not participate in community activities will be criticized or sanctioned? = 1 very unlikely ... = 5 very likely	2.41	1.51
Rice land	Total size of rice land currently being cultivated; in congs (1 cong = 1/10 hectare)	4.54	3.23
Saturday	= 1 if experiment was conducted on Saturday afternoon (first session)	0.57	0.49

The mean monthly income of about 1.8 million dong corresponds to about 95 USD, which is less than one USD per household member and day. The average household in the study is thus poor and the average education level is very low. The average size of the land a family is currently cultivating rice on is also rather small, approximately half of a hectare. Although the current bridge is degraded, it is still used by almost half of the households at

³ The options for the question regarding the current use of the bridge were: 1 = Every day, 2 = Around two to three times a week, 3 = Around once a week, 4 = Around twice a month, 5 = Around once a month or less, 6 = Currently do not use the bridge at all. Since relatively few answered options 2 and 3, we merged them in the descriptive statistics and in the analysis.

least twice a month, and almost 20% use it every day.⁴ The large average amount spent on social events, around 200 thousand dong per month or 13% of the total monthly household expenditure, reflects the importance of such events, including weddings and funerals. This cost may perhaps also reflect the social coherence of the family with the community. Around 10% of subjects are members of the communist party and approximately half of the families are members of at least one local association such as the Farmers', Women's or Veteran's Associations or the Youth Union. These variables are included in our analysis in order to test for possible associated social capital effects of belonging to these organizations on voluntary contributions. The variable Punish is included in order to test whether people's subjective perceptions of the strength of the social norms regarding free-riding affect actual contributions. This was assessed with the question "How likely is it that people who do not participate in community activities will be criticized or sanctioned?"

Based on *t*-tests, proportion tests, and chi-square tests, we cannot reject the hypothesis of equal distributions of household characteristics among the five different treatments, with one important exception: Although the five treatments (defined below) were randomly assigned to the households, the share of subjects who used the bridge often is significantly (and substantially) higher in treatment 3 than in all other treatments. Since this turns out to be an important explanatory variable for actual contributions, it will of course have implications for how to best analyze our data.

3. The threshold public goods game with a refund policy and proportional rebate rule

The experiment is based on a threshold public goods game⁵ (Isaac et al., 1989; Bagnoli and McKee, 1991; Cadsby and Maynes, 1999; Croson and Marks, 2000; Rondeau et al., 2005) with a refund policy and proportional rebate rule framework (e.g., Marks and Croson, 1998). In such a game, an identical endowment E is provided to each of N subjects; in our case $E = 400,000$ dong and $N = 200$. Each subject i decides privately how much x_i of the endowment to contribute to the public good. When the total contribution is larger than the threshold T , the public good will be provided; in our case, the bridge would be built if the total contributions would exceed 40,000,000 dong, corresponding to an average contribution of 200,000 dong. In

⁴ In the analysis, we will assume that the current use of the bridge is a good indicator of the use of the new bridge. For most households, this is most likely a reasonable assumption.

⁵ This framework relates closely to the lump-sum matching setting discussed in several papers (e.g., Baker II et al., 2009), where total contributions often are greater than with a standard voluntary contribution mechanism. However, if, in the matching setting, the contributions to the public goods do not meet the minimum requirement, those contributions still generate earnings for the subjects. In this threshold public good game setting, if the threshold cannot be reached, the refund policy is applied.

this case, subject i 's net payoff would equal the sum of the net private consumption after contributing x_i , which hence equals $E - x_i$, the own benefit from the public good G_i , and a share of the excess contributions in proportion to the magnitude of the own contribution relative to the total contributions. Individual i 's payoff function π_i is then given by the first line on the right-hand side below:

$$\pi_i = \begin{cases} E - x_i + G_i + \left(\sum_j^N x_j - T \right) \frac{x_i}{\sum_j^N x_j} & \text{if } \sum_j^N x_j > T \\ E & \text{if } \sum_j^N x_j < T \end{cases}$$

If, on the other hand, the total contributions fall below the threshold T , the public good will not be provided; in our case, the bridge would not be built. In this case, all contributions would be returned to the subjects, such that the payoff for each subject would simply equal the initial endowment E , as given by the second line on the right-hand side above.

It is clear that there are an infinite number of Nash equilibria in this game. In addition to the ones where no bridge is built and where each individual does not contribute anything, we have a continuum of Nash equilibria where the total contributions exactly equal the threshold level. Note that this is of course true regardless of whether the actual distribution of contributions is symmetric; for further details see Palfrey and Rosenthal (1984) and Bagnoli and Lipman (1989).

However, in our case we have that N is rather large (200),⁶ implying that the probability that the individual contribution decision will be decisive for whether the bridge will be built or not is small. It is easy to show that the condition for when an individual's choice has the potential of being decisive is that $\frac{N-2}{N-1} < \frac{x_{-i}}{T/N} < \frac{N}{N-1}$, where x_{-i} is the average of the others' contribution. In our case, where $N = 200$ and $T = 40,000,000$ dong, an individual can affect the decision of whether to build the bridge when $198,995 < x_i < 201,005$, where x_i denotes the average contribution when disregarding i 's contribution. This is clearly a narrow range. When x_{-i} is sufficiently low, i.e., smaller than 198,995 dong, the individual contribution does not matter at all, since the individual will receive E regardless of his/her own contribution.

⁶ In our case, it is realistic to assume that the group size is known and certain for the subjects since it was stated explicitly in the contribution agreement signed by the subjects, and they are well aware that all households in the village use the bridge; see de Kwaadsteniet et al. (2008) for discussions on uncertain group size impacts on cooperation.

When x_{-i} is sufficiently large, i.e., larger than 201,005 dong, the bridge will be built regardless of how much the individual contributes. Moreover, in this case the unique best response of the individual is to contribute nothing, i.e., to free-ride. Given this narrow range where the individual contribution matters for the decision of whether to build the bridge, and given the large range where the unique optimal response, based on conventional self-interested preferences, is to contribute nothing, we believe it is reasonable to interpret the individual contribution as a measure of the strength of social preferences, or cooperative behavior. Yet, one could argue that the unique symmetric efficient equilibrium where each household contributes 200,000 dong could serve as a focal point for the subject; cf. Schelling (1960). We will return to this issue in the results section.

4. Experimental Design

Our experimental design includes two stages. The first stage consisted of the field experiment with 200 households in Giong Trom village in Vietnam, while in the second stage, conducted four weeks after the experiment, a team of experimenters visited the same households to collect socio-economic data and other information that can help explain the experimental results.

4.1 Stage 1. The field experiment

In collaboration with an NGO we conducted the field experiment that involved five treatments: (1) a standard treatment with no reference contribution level and no default option, (2) a treatment with a high reference contribution level (300,000 dong) and no default option, (3) a treatment with a low reference contribution level (100,000 dong) and no default option, (4) a treatment with no reference contribution level and a default option at zero contribution and (5) a treatment with no reference contribution level and a default option at full contribution of the endowment. In all treatments, the contributions were anonymous to everybody except the experimenter. For ethical and practical reasons, the endowment of 400,000 dong was, following standard practice, a windfall gain for the subjects.⁷

⁷ The empirical evidence on windfall gains in public good games is not clear. Cherry et al. (2005) and Clark (2002) find no evidence of a windfall-gain effect on contributions, while Kroll et al. (2007) find significant differences in a public good experiment with heterogeneous endowment. Yet, while it is certainly possible that windfall gains affect behavior in a non-negligible way, our main interest is in the comparison between treatments and not in the absolute values, and we have no particular reason to believe that windfall gains would affect behavior differently among the treatments.

Following Alpizar et al. (2008), the treatments with different reference contribution levels were conducted by providing the subjects with information about a typical previous contribution of others. The typical contribution levels were obtained from the first no reference contribution treatment during the first day, i.e., from the treatment where we did not tell the subjects anything regarding others' contributions. Subjects were told that "we have interviewed other households in this village and one of the most common contributions has been 300,000 [100,000] dong." This statement reveals information about the typical behavior and not about any individual contributions. Thus, this conveys more information about the social norm than just stating the contribution of one other person.

The default option treatments were conducted using a metal card with different contribution levels. Zero dong was at the bottom of the metal card, 400,000 dong was at the top of the card, and there were in total 9 amounts on the metal card. A magnetic token was put at the 0 dong level or at the 400,000 dong level. Subjects in the corresponding treatments were asked to move the token to the amount that they wanted to contribute to the public good. There are several potential reasons why the default alternative could affect the subjects' choices. First, they might interpret the default alternative as indicative of the experimenter's expectations, in our case the expectations of the project. Second, they could interpret it as information about what others do. Third, it could serve as a simple anchoring effect.

Several considerations were made when deciding the size of the endowment and the threshold. The endowment couldn't be higher than the cost of building the bridge. Furthermore, a too high endowment could make subjects feel coerced to contribute some money and a too low endowment could seem unrealistic to the subjects, making us unable to observe sufficient variation in contribution levels.

Since we wanted the contribution decisions to be reasonably well informed and reflective, we felt it was necessary to provide some information about the possibility of building a bridge before the actual experiment took place. Specifically, we asked local officials to ask villagers about alternatives for the bridge, and whether they wanted a new bridge. One week before the experiment we held a meeting with local officials and some representative households, where we went into more details about funding options for the establishment of the bridge. One of the options mentioned at the meeting was the possibility of a matching fund mechanism, in which villagers would contribute some proportion of the bridge costs and external donors would contribute the rest. At the meeting, we also discussed

that a project team would visit households in the village in the next few weeks to ask about the “demand for the bridge” for the donors to decide whether or not a bridge should be built. Thus, the targeted group was given the possibility to absorb the information about a potential new bridge systematically over a relatively long time, such that they were not surprised when someone approached their home asking about contribution to the bridge. However, they did not know the details regarding funding and their own role until this information was given to them as part of the experiment instructions. Furthermore, it was in no way decided that the bridge would be built. The information was not detailed enough to enable the households to agree on a response before the experiment. These pre-experimental tasks also helped us achieve a 100% participation rate and assure credibility of the experiment. It should also be noted that local public goods are funded in a similar fashion from time to time in the area, and that the old bridge was actually funded by voluntary contributions of households in the village.

With the help of local officials, we were able to set up a list of household subjects. We then randomly allocated these to our experimenters. The five treatments were also randomly distributed among the experimenters. To make the subjects feel as accustomed as possible to the situation, we did not conduct the experiment in a common venue where participants came to make decisions, as seen in standard public good games. Instead, the subjects made contribution decisions in their own homes. This approach created an environment similar to other investment decisions that the families make in daily life and helped limit communication in our group of 200 subjects. Another advantage of this was that it facilitated, in most cases, joint family decisions⁸ rather than decisions made by single family representatives.

In the experiment, the experimenter initially introduced himself or herself as a member of the bridge project team who would like to know the demand for the bridge in order to make a final decision on the construction of the bridge. The experimenter proceeded by reading the experimental instructions and showing the subject the example cards (see Appendix 2). The threshold was explained with the following sentences.

“The concrete bridge will be established if all families together contribute at least 40 million dong. This means that if the total contribution is equal to or above 40 million dong, the project will use this money, add more funding in order to meet the costs of

⁸ One story told by an experimenter was that after listening to the context and reading the agreement, a husband told us that his family would like to contribute 300,000 dong to the bridge. Then the experimenter saw the wife kick her husband’s leg under the table, and finally they decided to contribute 100,000 dong.

the bridge, and take the responsibility to build the bridge. If the total amount of money collected exceeds 40 million dong, the excess amount will be returned to your family according to the proportion you contributed.

If the families are unable to contribute a total of 40 million dong, your contribution will be returned to you, and the concrete bridge will not be built.”

The actual cost of building the bridge was around 80 million dong, but since we did not have an exact cost estimate at the time of the experiment, we did not mention an explicit amount. Moreover, although there is always a non-negligible degree of uncertainty regarding the actual cost in a decision such as the present one, the supporting money meant that we could specify exact conditions for when the bridge would and would not be built. After this part, the experimenter presented the agreement. The agreement stated that the endowment of 400,000 dong would belong to the household. It also summarized the rules of the contribution framework⁹ as well as stated a date of payment, and had spaces for the signatures of the household and project representatives. Once the household had decided about its contribution, the amount was written on two photocopies of the agreement, which were then signed by the household representative. Each party kept one copy of the agreement. We could not pay them the cash directly, since the payment depended on the behavior of others.

Conducting the experiment at the individual households' homes presented two major challenges. First, we faced the risk that the information could spread among village members before all subjects had made their decisions. Such a spread of information could take place mainly through two channels: villager-to-villager and local officials-to-villagers. We were more concerned about the latter channel since local officials naturally wanted the bridge and could choose to visit the villagers and pressure them to contribute at least the level of the symmetric threshold efficient equilibrium, i.e., 200,000 dong. In order to reduce the risk of information spread, we had to use a larger number of experimenters than in a standard experiment. After balancing several factors such as number of experimenters, time requirement for a decision, and risk of information spread, we decided to conduct the experiment on a Saturday afternoon and on the following Sunday morning using 15 experimenters. Another purpose of choosing Saturday and Sunday was to limit the observation or intervention of other local government officials since they were off work.

⁹ In the agreement, it was made clear that the project and not the local government would be responsible for building the new bridge if the threshold could be reached. This helped avoid possible problems with distrust in the government.

Using 15 experimenters meant that we could conduct the experiment at 15 households at a time. The experiments were conducted in such a way that each household's closest neighbors conducted the experiment at the same time, in order to reduce the risk of information spread. Finally, we used the fact that the bridge was severely degraded and conducted the experiment on one side of the bridge on Saturday and on the other side on Sunday.

This set-up of the experiment required the 15 experimenters to each make 13 to 14 visits. Each visit took on average 20 minutes. Due to the challenge of experimenter bias, we took great care in the process of recruitment and training. The experimenters were recruited via advertisements at the University of Economics in Ho Chi Minh City. We selected only those who met our requirements regarding personality and ability to talk with farmers, e.g., those with the appropriate dialect. The selected persons went through extensive training in the classroom and in the field. They spent nearly one week practicing the experiment in role-play pairs and for pilot interviews with farmers. Moreover, before the experiment, the experimenters had spent more than one month in a similar rural area in connection with another survey, so they understood well what to do and what not to do when visiting a household. We also prepared a list of questions and answers related to the project, and to the establishment of the bridge in particular, so that the experimenters would have similar answers to common questions. During the training and practice sessions, the experimenters were repeatedly told about the importance of using the exact prescribed wording of the experiment scenarios. They were also required to repeat the scenario until the subject understood it without any further explanation.

4.2 Stage 2. The household survey

Four weeks after the experiment, all the households were visited by a group of enumerators (not the same ones as we used in the experiment). The enumerators said that they came from the university to collect data for research purposes. This survey was part of a larger research project concerning villagers' adaptation to climate change. The part of the questionnaire that relates to this project includes a socio-economic demography section (e.g., income, assets, age, education etc.) and a section on social capital (e.g., association social capital indexes, trust questions etc.). There were two questions regarding the household's current use of the bridge. The purpose of these questions was to classify bridge users into two groups: low and high demand for the bridge.

5. Results

5.1. Descriptive results

In total, 200 households participated in the experiment. The overall average contribution was substantial, 270,000 dong, and a large majority (78%) of the subjects contributed the threshold level or more. These are extremely large contribution levels compared to most contribution levels observed in threshold public good games; see Croson and Marks (2000) for a review. The levels are particularly striking as there is evidence that thresholds, if anything, tend to reduce contributions (Rondeau and List, 2008; Rauchdobler et al., 2010). Yet the results are consistent with previous findings on contribution levels among poor Vietnamese households; Carpenter et al. (2004 a, b) found average contribution levels of around 70% of the endowment in a public good game conducted with poor Vietnamese households. Moreover, Cardenas and Carpenter (2008) found large cooperation rates more generally in various kinds of field experiments conducted in developing countries.

It is also likely that many of the households would greatly benefit from building the bridge, even though each household would of course financially benefit even more from free-riding. In all five treatments, the average contribution is above the threshold of 200,000 dong. Consequently, the bridge was actually built; see Figure 3 for a picture of the new bridge. The Appendix presents the basic results of the experiment. However, since, as mentioned, the randomization procedure unfortunately did not result in similar distributions among the sub-samples with respect to a key explanatory variable, the use of the bridge, we will focus our analysis on the results from a regression analysis.



Figure 2. The new bridge

At the end of the experiment, the subjects were asked to guess how much they believed other households would contribute. This question was not incentivized, since we wanted to

avoid them thinking of the visit as part of a research study.¹⁰ Twenty-two percent of the subjects said they could not make a guess, and they were not forced to do so.¹¹ Figure 3 presents own contribution and the guessed contribution of others; we include all observations from all five treatments and the size of a bubble corresponds to number of subjects.

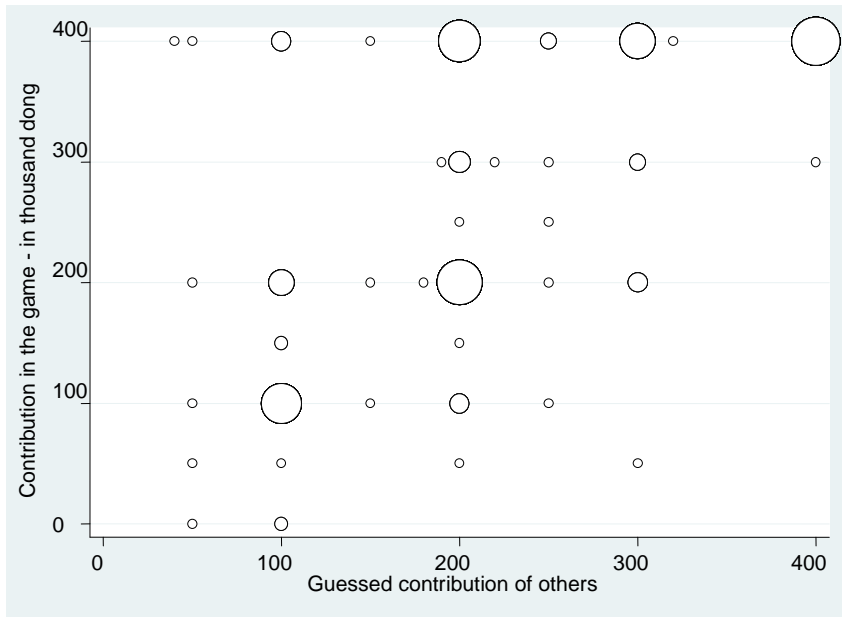


Figure 3. Plot of own contribution and guessed contribution of others

There is a strong correlation between own contribution and the guessed contribution of others; the correlation coefficient is 0.62. A large proportion of subjects who donated 400,000 believed that others would contribute 300,000 or 400,000 dong, and a large proportion of subjects who donated 100,000 dong believed that others would contribute 100,000 or 200,000 dong. The graph suggests that there are three main categories of subjects, where the categories are not exclusive: *i*) Conditional cooperators, i.e., those who contribute the same amount as they guess that others on average would contribute, can be illustrated in Figure 3 as the 45-

¹⁰ There are potential problems with eliciting beliefs, although the major problem of learning does not concern our experiment since it is a one-shot game (see, e.g., Rutström and Wilcox, 2010). In addition, Gächter and Renner (2010) show that incentivized beliefs increase belief accuracy in a 10-period public good game, whereas beliefs in the first periods in incentivized and non-incentivized treatments are not affected. Moreover, the relationships between beliefs and contribution are identical in incentivized and non-incentivized treatments.

¹¹ There could be a number of reasons for someone not to make a guess, ranging from simply not having any idea about what others are responding to wanting to avoid an explicit comparison with own contribution. We estimated a binary probit model where the dependent variable is one if the subject did not make a guess. None of the treatment effects are significant. The only significant effects we find are that older subjects are more likely not to make a guess, and that subjects were more likely to make a guess on the first day of the experiment.

degree line through the origin; 45 percent of the subjects are consistent with conditional cooperation according to this definition. *ii*) Those who contributed the full amount irrespective of how much they thought others would contribute. This group can thus be seen as the horizontal line at the top of the graph; 45 percent are consistent with this contribution pattern. *iii*) Those who contributed their fair share regardless of their expectation about others' contribution. This group can be illustrated by a horizontal line at the contribution level 200; 25 percent are consistent with this pattern. At the same time, in some of the treatments, subjects received information about others' behavior. This might not only affect their behavior, but also the expectations about others' behavior. However, the treatment effects on the guesses regarding others' contribution behavior are surprisingly small, and in all cases, the average guess is lower than in the reference treatment. The Appendix presents the results of a simple regression model with the guessed contribution of others as the dependent variable. All coefficients of the treatments are negative, yet insignificant.¹²

As discussed in Section 3, a public good game has a unique symmetric efficient equilibrium, where each household would believe that all other households would contribute 200,000 dong, and thus they also would contribute 200,000 dong. However, Figure 3 shows that although a substantial fraction (34%) of the subject believed that others would contribute 200,000 dong, this is still a minority. Moreover, many of those who expected others to on average contribute 200,000 dong did not contribute this amount themselves. Overall, only 14% both contributed 200,000 dong and expected others to on average contribute this amount.

5.2 *Econometric analysis*

Since there are some rather substantial differences between the samples in terms of their use of the bridge, it is important to control for the effect of the socio-economic characteristics. The first model we estimated is a standard OLS model where the dependent variable is the level of contribution; we also estimated a Tobit model with censoring at zero and 400,000, and the results are very similar to the ones of the OLS model.¹³ We also estimate two probit models: In the first model, the dependent variable is equal to one if the contribution was 100,000 or less, whereas in the second model the dependent variable is equal to one if the contribution was 300,000 or more. Thus, these probit regressions reflect the determinants of

¹² This result is roughly in line with Altmann and Falk (2009), who found that the differences in beliefs between two default treatments and the base case were not significant, although the descriptive results show an increase in the expected sum of contributions by other group members from the default at zero contribution treatment to the default at full contribution treatment.

¹³ These results are available from the authors upon request.

contributing a small or a large amount, respectively. In addition, we estimate all three models with and without two important variables that could be correlated with the socio-economic characteristics and the treatment effects: *i*) the variable measuring whether they think it is likely that people who do not participate in community activities are punished and *ii*) the expectation regarding others' contributions. The results are presented in Table 2. In all models, we include dummy variables for the experimenters.

The regression results show that when controlling for household characteristics, there is a significantly lower average contribution in the treatment with a low reference contribution than in the treatment without any reference information. At the bottom of the table, we also report F-tests of the hypothesis of equal treatment coefficients, and this reveals that there is a significantly lower average contribution in the treatment with a low reference contribution than in the treatment with a high reference contribution. On average, subjects contributed 67,000 dong less – from an endowment of 400,000 dong – in the low-reference contribution treatment than in the treatment without any reference information (in the first regression model). However, there is no significant difference between the standard treatment and the high-reference contribution treatment. Note also that if the respondents were to act strategically based on pure self interest, we would if anything be observing that people contributed less if they believed that others were going to contribute more. Consequently, to the extent that such a strategic effect exists, the measured effects of social influence are underestimated. If people are informed that one of the most common contributions by others is 100,000 dong, they tend to contribute around 67,000 dong less themselves, whereas if they are told that one of the most common contributions by others is 300,000 dong there is no difference compared to not saying anything about others' contribution. Given that the overall average contribution in the experiment (270,900 dong) is not very far from 300,000 dong, this result is not surprising.

Similarly, the two probit models reveal that it is more likely (around 27 percentage points more likely) that subjects give 100,000 dong or less and less likely (around 24 percentage points less likely) that they give 300,000 dong or more when they are told that a common contribution is 100,000 dong; both of these effects are significant. However, just as in the OLS model on the level of contribution, there are no significant effects of the high reference contribution treatment.

Table 2. OLS regressions on contribution and probit models on low and high contributions; reference contribution and default treatments

	OLS: Contribution in thousand dong		Probit: = 1 if contribution ≤ 100,000		Probit: = 1 if contribution ≥ 300,000	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
High reference contribution	-14.737 (27.717)	3.348 (21.992)	-0.002 (0.086)	0.001 (0.028)	0.001 (0.124)	0.106 (0.158)
Low reference contribution	-67.093** (28.297)	-54.077** (22.802)	0.271** (0.132)	0.302* (0.156)	-0.240** (0.124)	-0.277* (0.166)
Default at full contribution	-15.220 (27.638)	-7.351 (22.105)	0.007 (0.089)	0.012 (0.036)	-0.026 (0.127)	0.062 (0.173)
Default at zero contribution	-54.275* (28.285)	-55.724** (22.430)	0.120 (0.111)	0.151 (0.119)	-0.193 (0.123)	-0.284* (0.155)
Household size	4.811 (5.883)	2.960 (4.710)	-0.007 (0.017)	-0.002 (0.005)	0.025 (0.025)	0.020 (0.038)
Age	0.174 (0.756)	-0.289 (0.612)	-0.002 (0.002)	0.000 (0.001)	0.002 (0.004)	0.002 (0.005)
Male	-7.453 (18.717)	-12.824 (14.872)	0.011 (0.053)	-0.007 (0.017)	-0.048 (0.087)	-0.088 (0.114)
Education	12.607 (13.840)	-2.297 (11.071)	-0.031 (0.043)	0.008 (0.013)	0.086 (0.069)	0.060 (0.095)
Income	0.263 (0.812)	0.706 (0.650)	-0.002 (0.002)	-0.001 (0.001)	0.002 (0.004)	0.004 (0.005)
Rice land	0.304 (3.069)	-0.493 (2.430)	-0.016* (0.010)	-0.003 (0.003)	-0.002 (0.014)	0.008 (0.019)
Communist party member	24.087 (31.863)	45.331 (25.316)	-0.003 (0.111)	-0.013 (0.018)	0.102 (0.143)	0.244 (0.155)
Association	9.805 (19.708)	13.661 (15.600)	0.011 (0.057)	0.002 (0.017)	0.042 (0.090)	0.151 (0.120)
Social events	16.39** (7.264)	20.77*** (5.815)	-0.026 (0.023)	-0.009 (0.010)	0.066 (0.033)	0.150*** (0.044)
Use the bridge daily	115.001*** (27.763)	80.583*** (22.221)	-0.159*** (0.041)	-0.037 (0.026)	0.483*** (0.080)	0.535*** (0.088)
Use the bridge weekly	75.956** (35.632)	78.431*** (28.187)	0.077 (0.078)	-0.014 (0.020)	0.374*** (0.107)	0.459*** (0.086)
Use the bridge twice a month	64.336** (28.015)	34.362 (22.368)	-0.012** (0.048)	-0.018 (0.017)	0.308*** (0.105)	0.244* (0.145)
Use the bridge once a month	29.417 (24.716)	35.251* (19.556)	0.103 (0.078)	0.039 (0.039)	0.223** (0.108)	0.385*** (0.129)
Saturday	-16.426 (19.002)	-21.459 (15.543)	-0.031 (0.055)	-0.003 (0.017)	-0.147** (0.086)	-0.240** (0.119)
Punish		20.558*** (4.954)		0.009 (0.008)		0.137*** (0.042)
Guessed contribution of others		0.722*** (0.081)		-0.001* (0.001)		0.006*** (0.001)
No guessed contribution of others		151.746*** (26.502)		-0.087** (0.043)		0.729*** (0.069)
Constant	102.574 (71.771)	87.504 (60.913)	1.336 (1.018)	1.950 (1.475)	-2.390*** (0.897)	-5.677*** (1.695)
	F-test (p-value)	F-test (p-value)	F-test (p-value)	F-test (p-value)	F-test (p-value)	F-test (p-value)
H ₀ : High reference = low reference contribution	3.40 (0.067)	6.32 (0.013)	5.64 (0.018)	8.76 (0.003)	3.40 (0.065)	4.84 (0.028)
H ₀ : Default at full = default at zero	1.89 (0.171)	4.61 (0.033)	1.27 (0.259)	3.66 (0.056)	1.69 (0.194)	3.85 (0.050)
Experimenter dummy var.	Included	Included	Included	Included	Included	Included
No. of obs.	200	200	200	200	200	200
Adj. R2 / Pseudo R2	0.119	0.446	0.227	0.497	0.209	0.506

*, **, and *** denote that the coefficient is statistically significant at the 10%, 5%, and 1% levels, respectively.

For the default treatments, we find that the zero-contribution default has a larger effect than the full-contribution default. Yet, similar to the reasoning above regarding the effect of reference contribution levels, this need not mean that a full-contribution default does not have an effect in general, since in our experiment the contribution levels are on average very high. A zero-contribution default, compared to no default, reduces the contribution by about 54,000 dong, which is a substantial amount corresponding to about 20% of the average contribution. A comparison of the full-contribution and zero-contribution defaults reveals that the difference in contributions is only significant in the second model. Moreover, the two probit regressions reveal that it is less likely (around 20-28 percentage points less) that subjects give 300,000 dong or more with the zero-contribution default than with no default contribution. There is however no significant effect on the likelihood of giving 100,000 dong or less.

Among the household characteristics, how much the household used the bridge is an important determinant of the amount of money contributed to the bridge. In the model where we do not include the expected contribution of others, households that used the bridge every day contributed, on average, around 115,000 dong more than households that did not use the bridge (the reference category). There are, however, no significant effects of age, gender of household head, level of education, size of land, or household income on contribution. Among the variables intended to measure social capital, only the social events variable is significant. Households with high monthly expenditures for social events contributed significantly more than other families.

In the second set of models, we include expectations about others' behavior and a variable capturing the subjective risk of punishment if one does not contribute to local public goods. There is also a strong positive correlation between own contribution and the expected contribution of others. The coefficient is 0.72, meaning that a one dong increase in the expectation of others' contribution increases the own contribution by 0.72 dong. This is fairly consistent with what others have found; for example Gächter and Renner (2010) found in a repeated public good game that a one unit increase in beliefs increases contributions by 0.54 tokens in the last period of the game (when there are no strategic motives to act as a conditional cooperator). Subjects who did not provide a guess contributed around 150,000 dong more than other subjects.

One should be careful not to draw too strong casual conclusions from the results regarding the link between guesses and contributions. As mentioned, the question about

others' contribution was not incentivized, and it is not at all clear that subjects were able to separate their own preferences from what they thought others were doing. Moreover, the causality may in part go from own contribution to state expectations, rather than the other way around.¹⁴ However, it is interesting that the expectations about others' behavior do not affect the other parameter estimates to any large extent, with the exception that the impact of the current use of the bridge is reduced somewhat, and that membership in the communist party now has a weakly significant and positive effect on the contribution level. In particular, the coefficients for the various treatments are still of the same order of magnitude and remain significant. Consequently, if the guessed contribution of others captures conditional cooperation, then the effects of, e.g., a zero default contribution or a low reference contribution level is something different from conditional cooperation.

The punishment variable has a significant effect on contribution behavior. Subjects who thought they would be more likely to be punished if they did not contribute to local public goods (in general) gave more to the public good in our experiment, which follows intuition.

6. Conclusions

In this paper we analyze a field experiment with real contributions to an archetypical public good, a bridge, in rural Vietnam. In particular, we study the role of two types of social influence: *i*) conditional cooperation, i.e., that people may be more willing to cooperate if others do and *ii*) the effects of the default alternative, i.e. that people are often found to be influenced by the default alternative presented to them in the choice situation. Numerous studies have analyzed the role of conditional cooperation in laboratory experiments (see, e.g., Fischbacher, 2001; Fischbacher and Gächter, 2010) and for charitable giving (see, e.g., Alpizar et al., 2008; Shang and Croson, 2009) as well as the effects of defaults for the choice of private goods (see, e.g., DellaVigna and Malmeinder, 2006). Yet, as far as we know, no previous studies have tried to quantify the treatment effects of conditional cooperation and default alternatives on the voluntary contributions of a real local public good. We find significant and substantial effects of provision of reference information about what others are doing and of default alternatives, which is in line with previous findings in laboratory experiments and for charitable giving. For example, if people were informed that one of the most common contributions made by others was 100,000 dong (a relatively low contribution),

¹⁴ There are at least two plausible psychological mechanisms behind such reversed causality: The false consensus effect, i.e., the tendency to overestimate the degree of agreement that others have with them (Ross et al., 1977), and simple cognitive anchoring effects (Tversky and Kahneman, 1974).

they tended to contribute around 67,000 dong (or about 25%) less compared to when not saying anything about others' contribution. Similarly, a zero default contribution, compared to a treatment with no default contribution, reduced the contribution by about 54,000 dong, which is a substantial amount corresponding to almost 20% of the average contribution. These findings are important as they contribute to our general understanding of the determinants of contributions to a real public good, in particular in developing countries. This is important since there is much evidence that the ability to provide an adequate amount of public goods is crucial for economic and social development. The results are also potentially important from a more direct policy perspective at different levels. In Vietnam, many local public goods are funded by the villages themselves. Our experiment suggests that a matching fund voluntary contribution mechanism could be a useful instrument. Moreover, our results reveal that the behavior and contribution of subjects depend on the framing of the questions asked. However, from the perspective of the 200 households in the Giong Trom village in Vietnam, the most important result of this study is clearly that they now have a new and well-functioning concrete bridge in place.

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Appendix 1.

Table A1. Descriptive results of the field experiments

Treatment	Obs.	Mean contribution in 1,000 dong (std. dev.)	Share of contributions				
			= 0	= 100	= 200	= 300	= 400
Reference treatment	40	287.5 (199.7)	0.000	0.125	0.275	0.075	0.475
Low reference contribution	41	247.6 (132.3)	0.025	0.244	0.268	0.073	0.366
High reference contribution	39	284.6 (108.9)	0.000	0.128	0.282	0.205	0.385
Default at zero	38	245.3 (130.4)	0.000	0.132	0.263	0.079	0.342
Default at full	42	288.1 (141.3)	0.071	0.119	0.167	0.024	0.500

Table A2. Distribution of contributions for each treatment

Contribution	Reference	High reference contribution	Low reference contribution	Default zero contribution	Default full contribution
0	0	0	1	0	3
20	0	0	0	1	0
50	1	0	1	3	0
100	5	5	10	5	5
150	0	0	0	2	2
200	11	11	11	10	7
250	1	0	0	1	0
300	3	8	3	3	1
400	19	15	15	13	24
Total	40	39	41	38	42

Table A3. OLS regressions on guessed contribution of others

Variable	Coefficient	P-value
High reference contribution	-21.330	0.453
Low reference contribution	-48.919	0.088
Default at full contribution	-34.087	0.220
Default at zero contribution	-11.615	0.683
Household size	-2.363	0.671
Age	0.869	0.262
Male	1.551	0.936
Education	24.976	0.076
Income	0.041	0.957
Rice land	0.012	0.997
Communist party member	-38.557	0.265
Association	-11.764	0.562
Social events	0.011	0.880
Use the bridge 1	51.725	0.069
Use the bridge 2	-9.096	0.801
Use the bridge 3	39.504	0.163
Use the bridge 4	-8.767	0.725
Day of experiment	-4.370	0.825
Constant	103.721	0.141
Experimenter dummy variables	Included	
No. of obs.	155	
Adj. R2	0.02	

Appendix 2. Experimental instructions

Hello,

As you may be aware, the Environmental Economics Unit of the Ho Chi Minh City University of Economics is considering several alternatives in constructing a concrete bridge in this village. My name is..... I am a representative of this organization and would like to ask you about your opinions on the construction of the bridge.

You and your neighbors will decide whether to build the concrete bridge or not. We are giving money to households and letting them decide how to use it. We are asking households to contribute from this money to fund the bridge construction. We will respect the choice of every villager. We won't evaluate whether your choice is right or wrong.

Now I would like to briefly introduce the bridge project. A new concrete bridge is being considered to be built to replace the degraded Cầu Kinh Giữa. The new bridge would be a concrete bridge that will last about 20 years. The bridge would be 2 meters wide so even tractors can use the bridge. The bridge is a common asset, so everyone who is living in or out of the commune has the right to use it without paying any fee.

Now we would like to know your opinion about the possible construction of the concrete bridge. We are also talking with all other households in your village. The project will give 400,000 dong to each family in this neighborhood, which includes 200 families. Here is the agreement saying that 400,000 dong belongs to your family.

Note that you are in the group of 200 families living in this neighborhood and only these families are financially supported by the project. And now your family, together with other 199 families, has to decide whether the bridge should be built or not. Here is the information you need to consider to make your decision:

- Each family has 400,000 dong provided by the project.
- We would like to ask how your family would want to use this money. You can choose any amount to allocate to the construction of the bridge, from 0 dong to 400,000 dong.
- The concrete bridge will be established if all families together contribute at least 40 million dong. This means that if the total contribution is equal to or above 40 million dong, the project will use this money, add more funding in order to meet the costs of the bridge, and take the responsibility to build the bridge. If the total amount of money collected exceeds 40 million dong, the excess amount will be returned to your family according to the proportion you contributed.
- If the families are unable to contribute a total of 40 million dong, your contribution will be returned to you, and the concrete bridge will not be built.”
- Your family is under absolutely no obligation to contribute any money to the concrete bridge, as the money is yours. Even if your family is not willing to contribute or is

willing to contribute only a small amount, if the bridge goes into operation you will have the full right to use the bridge since the bridge is common property.

- No one in the commune, not even the officials, will know about your decision. We will keep your contribution information secret.

If the households are able to contribute 40 million dong in total, our project in cooperation with the Farmers' Association will start the construction in the next few months.

I will give you several examples of the decision rule. Please look at the poster here.

[Example posters]

Example 1:

Suppose your family contributes 100,000 dong to the concrete bridge. Also suppose that there is a total of 30 million dong contributed to the concrete bridge. Because the community did not meet the 40 million dong requirement, the concrete bridge is not built. The 100 000 dong your family contributed to the concrete bridge is not lost; it is simply returned to you. You will have 400,000 dong.

Example 2:

Suppose your family contributes 200,000 dong to the concrete bridge. Assume the total contribution to the concrete bridge is 45 million dong. At this point, the concrete bridge will be built, regardless of who contributes what to the construction. The 5 million in excess of the contribution requirement will be returned to your family in proportion to your contribution. The return will be $(0.2/45) \times 5$ million = 22,000 dong. In total, your family will have $400,000 - 200,000 + 22,000 = 222,000$ in cash and the concrete bridge will be built.

Example 3:

Suppose your family contributes 100,000 dong to the concrete bridge. Assume the total contribution to the concrete bridge is 40 million dong. At this point, the concrete bridge will be built, regardless of who contributes what to the construction. In this case, your family will have $400,000 - 100,000 = 300,000$ dong in cash and the concrete bridge will be built.

I hope you clearly understand the way you can contribute to the concrete bridge. We will keep your contribution decision anonymous. This means that no one in the village, not even the people working with us in the Farmers' Association, will know about your contribution.

Treatment 1

Of the 400,000 dong you are provided and that becomes your own asset, how much is your family willing to contribute to construction of the concrete bridge?

_____dong.

Finally, we would like to ask you one more question. How much do you think other families will contribute on average? _____dong. Your guess will be kept anonymous. No one will know your estimation.

Treatment 2

We have interviewed other households in this village and one of the most common contributions has been 300,000 dong.

[Experimenter: stop here for 1 minute so that the subject can think about the meaning of this information. You should not need to explain further if there is no query]

Of the 400,000 dong you are provided and that becomes your own asset, how much is your family willing to contribute to construction of the concrete bridge?

_____dong.

Finally, we would like to ask you one more question. How much do you think other families will contribute on average? _____dong. Your guess will be kept anonymous. No one will know your estimation.

Treatment 3

We have interviewed other households in this village and one of the most common contributions has been 100,000 dong.

[Experimenter: stop here for 1 minute so that the responder can think about the meaning of this information. You should not need to explain further if there is no query]

Of the 400,000 dong you are provided and that becomes your own asset, how much is your family willing to contribute to construction of the concrete bridge?

_____dong.

Finally, we would like to ask you one more question. How much do you think other families will contribute on average? _____dong. Your guess will be kept anonymous. No one will know your estimation.

Treatment 4

[Experimenter: show the Card T4]

Of the 400,000 dong you are provided and that becomes your own asset, how much is your family willing to contribute to construction of the concrete bridge? Please move the token to the amount your family is willing to contribute.

_____dong.

Finally, we would like to ask you one more question. How much do you think other families will contribute on average? _____dong. Your guess will be kept anonymous. No one will know your estimation.

Treatment 5

[Experimenter: show the Card T5]

Of the 400,000 dong you are provided and that becomes your own asset, how much is your family willing to contribute to construction of the concrete bridge? Please move the token to the amount your family is willing to contribute.

_____dong.

Finally, we would like to ask you one more question. How much do you think other families will contribute on average? _____dong. Your guess will be kept anonymous. No one will know your estimation.

Paper II

Are Social Preferences Stable over Time?

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Abstract

We use a combination of two natural experiments and one field experiment to measure people's prosocial behavior in terms of voluntary money and labor time contributions to an archetypical public good – a bridge – in rural Vietnam, at three different points in time from 2005 to 2010. Since the experiments are far apart in time, potentially confounding effects of moral licensing and moral cleansing are presumably small, if at all existent. We find a strong positive and statistically significant correlation between voluntary contributions in these experiments, whether correcting for other covariates or not. This result suggests that prosocial preferences are at least partly stable over long periods of time.

JEL classification: C93, H41

Keywords: Natural experiment, field experiment, preference stability, social preferences, moral licensing, moral cleansing.

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1. Introduction

An overwhelming amount of psychological and behavioral economics research shows that the *Homo Economicus* characterization of human behavior, in terms of complete selfishness in a narrow material sense, is often wrong; human behavior is indeed in part prosocial. At the same time, a large heterogeneity in prosocial behavior is typically found. Several studies have consequently attempted to categorize people, as revealed by their experimentally observed behavior, in terms of different types of social preferences, e.g., as free-riders, conditional cooperators, and unconditional cooperators (Fischbacher et al., 2001), as selfish versus inequity averse individuals (Fehr and Schmidt, 1999), and as non-sharers, reluctant sharers, and willing sharers (Lazear et al., 2010). Yet, from these studies one cannot conclude that people are inherently of different types. An alternative explanation is that people simply act differently at different moments in time, and that different people's degree of cooperativeness, or non-selfishness, is approximately constant *on average*. Indeed, that people's prosocial actions vary over time is obvious since most of us sometimes contribute to a certain charity and sometimes do not. Yet, how much of the observed heterogeneity in social preferences that can be explained by within-people variations is not clear, nor is it clear whether an individual who acted cooperatively in one moment in time is significantly more likely to act cooperatively in a similar task several years later. The present paper aims to investigate the stability of social preferences by utilizing data on people's voluntary contributions to an archetypical public good, a bridge, in rural Vietnam.

To what extent preferences, and in particular social preferences, are stable across decision environments has been studied in a number of papers using different methodologies. A sub-set of these studies have looked at the differences in prosocial behavior between similar experiments conducted at different points in time. For example, Brosig et al. (2007) conduct dictator and public good games with the same subjects at several points in time during one week. Other-regarding behavior is found to decrease over time, and in the final experiments the subjects' behavior was close to what would be predicted by conventional economic theory. Subjects who behave selfishly are found to be the only ones who behave stable over time. This pattern is similar to what is typically obtained with repeated public good games.¹ De Oliveira et al. (2009), on the other hand, find that preferences regarding contributions to

¹ See, e.g., Isaac et al. (1984), Andreoni (1995), and Fehr and Gächter (2000). Different explanations have been proposed, including initial confusion and learning (e.g., Andreoni, 1988) and some versions of conditional cooperation (e.g., Fischbacher et al., 2001; Fischbacher and Gächter, 2010).

public goods are positively related both across different experimental decision contexts and to self-reported donations and volunteering outside the laboratory. Cesarini et al. (2009) use twin studies combined with modified dictator experiments in order to determine the extent to which giving is heritable; their best point estimate suggests that genes explain about 20% of the variation in behavior among subjects.

Other studies have compared contributions in the lab and the field. Benz and Meier (2008) conduct a dictator game with two social funds as external recipients, and find a positive, albeit relatively weak, correlation between behavior in a lab experiment and actual charitable giving by the same subjects. Laury and Taylor (2008) find mixed evidence regarding the correlation between non-selfish behavior in laboratory experiments and contribution to a naturally occurring public good. While they find that some measures of altruistic behavior in the lab can be predictive of contributions to naturally occurring public goods, the relationships are generally weak, and some measures of altruism were even negatively correlated with contribution to the naturally occurring public good. Karlan (2005) finds that based on a trust game in Peru, subjects identified as trustworthy, i.e., receivers who return a relatively large share of what they received from the senders tend to repay their micro credit loans to a larger extent than those who are identified as not trustworthy. No significant correlation between those identified as trusting, i.e., senders who sent a relatively large share to the receivers, and repayment of the loans was obtained.

In summary, there is no consistent pattern from existing studies regarding to what extent social preferences are stable over time. One possible explanation to the observed variation relates to what psychologists denote *moral licensing* (Monin and Miller, 2001), which suggests that people who have undertaken a praiseworthy action get an implicit license to subsequently conduct a more selfish act. There is a great deal of empirical support for such licensing effects. For example, Mazar and Zhong (2010) find experimentally that people become less altruistic after purchasing environmentally friendly products than after purchasing conventional products. Similarly, and symmetrically, there is also a great deal of evidence of *moral cleansing*, referring to compensatory behavior when people's moral self-worth has been threatened (e.g., Carlsmith and Gross, 1969; Tetlock et al., 2000). In a recent economics experiment, Gneezy and Imas (2010) find, in line with moral cleansing, that people who lie or do not return money they have received by mistake are more likely than others to donate to charity.

Moral licensing and moral cleansing effects taken together suggest that people want to preserve a certain image in the moral domain, an image that, in turn, largely depends on undertaken actions. This implies that we have a possible confounding effect when testing for stability of social preferences. Consider for example a case where a number of people act as senders in two identical dictator experiments (with different receivers). Based on inherent differences in social preferences, one would expect that those who sent more in the first round would also send more in the second. Yet, based on moral licensing or moral cleansing (depending on the reference points for bad versus good actions), one would expect that an individual who sent more in the first round would as a result send less in the second. One way around this confounding effect would be to set up the tests with a relatively long time span in between, so that moral licensing and moral cleansing effects can be ignored. This is the strategy used in the present study.

Another advantage of the long time span is that we can test whether the underlying preferences are the same for long periods. After all, that the underlying preferences would be approximately constant with the time frame of a couple of days is what we would expect. Whether the same can be said based on a time frame of several years is much less obvious.

In the present paper we use observations on subjects' prosocial behavior in three related events separated by reasonably long time periods. Two of the events are naturally occurring ones where we simply observed the behavior, and may hence be classified as natural experiments, while the remaining (intermediate) one was designed by the authors.² The first two concern monetary contributions to a local public good in terms of the construction of a much needed bridge in the middle of a village, while the last experiment concerns labor contributions to the construction of the same bridge. Although all the experiments use voluntary contribution mechanisms, there are a number of contextual differences, yet for all three events we observe the behavior of the same 200 subjects, representing all households in the village. The paper is organized as follows. Section 2 briefly describes the experiments, Section 3 provides corresponding background statistics and experimental design, and Section 4 presents the results. We find a strong positive and statistically significant correlation between voluntary contributions in these experiments, whether correcting for other covariates

² In this experiment, the local people conducted acts that were rather natural to them and that they might have been asked to conduct without any university study involved. At the same time, however, some elements of the study might have been perceived as slightly unnatural, such as estimating others' contributions, implying that it does not completely fulfill the Harrison and List (2004) criteria for being labeled a natural field experiment.

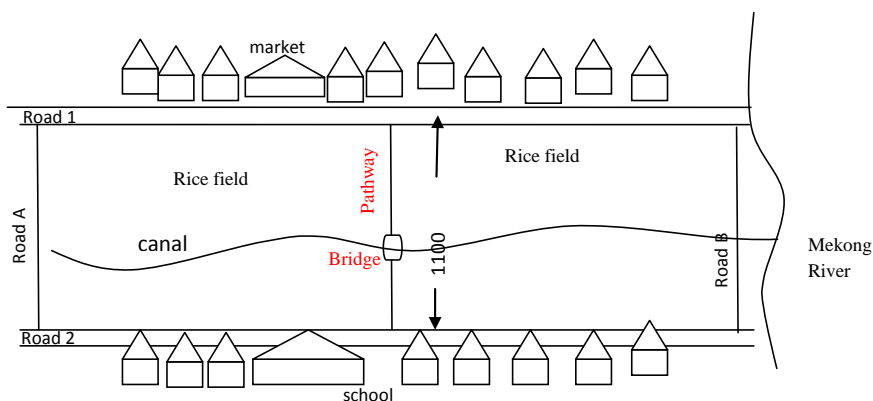
or not, which suggests that prosocial preferences are at least partly stable over long periods of time. Section 5 briefly discusses order of magnitudes and concludes the paper.

2. The Three Experiments

The experiments were undertaken in the Giong Trom village in the Mekong River Delta of Vietnam in 2005, 2009, and 2010.³ There are about 200 households in the village, most of which engage in rice cultivating activities. All of these households are included in our three experiments. The village suffers one of the typical problems in the Mekong River Delta: the lack of basic infrastructure such as rural roads, bridges, and irrigation canals. The government only provides larger public goods such as roads between villages. The small-scale infrastructure within a village is considered to be the village's responsibility. All three experiments concern the funding of a bridge for the village.

2.1 The bridge and the three experiments

The bridge is important for the village because villagers use it to go to the rice fields, to the market, to visit friends, and to get to school. If they do not use the bridge, they have to use alternative routes, either road A or road B, which are located parallel to and about 1,200 meters from the bridge's pathway; see the following map.



In the first experiment in 2005, households in the village contributed to build the bridge. Since they could not afford to build a more durable concrete bridge, the village council decided to build a wooden bridge funded by voluntary contributions. Yet, the bridge became degraded relatively quickly, and in 2009 its shape was as seen in the picture below:

³ A village is a small commune or part of a commune, and consists of around 100 to 300 households.



As can be seen, the wooden bridge was highly degraded and could obviously not be used for tractors and motorbikes. In 2009, we set up a field experiment, the second experiment in this paper, which included a threshold public good game concerning funding of a concrete bridge. Since the households contributed enough to reach the threshold, the new bridge was built in early 2010; see the picture below:



Even though the money collected was sufficient for the construction of the bridge, some related physical work was needed and decided upon by the village council in 2010. Data on voluntary time contributions by different households was collected by the council and then shared with us.

As mentioned, all three experiments were related to the bridge in the village. The first experiment concerned monetary contributions to build a small wooden bridge in 2005; the second one, in 2009, concerned monetary contributions to build a new and better concrete bridge; and the third experiment concerned voluntary labor contributions related to the new concrete bridge in 2010. The settings of these three experiments are summarized in Table 1.

Table 1. Characteristics of the three experiments

Characteristics	Experiment 1	Experiment 2	Experiment 3
Time	July 2005	August 2009	March 2010
Contribution mechanism	Voluntary	Voluntary	Voluntary
Anonymity	No	Yes	No
Framework	Fundraising campaign	Threshold public good game	Fundraising campaign
Windfall money	No	Yes	No
Contribution range	[0, .) thousand dong	[0, 400] thousand dong	[0, 3.5] labor days
Organizer	Local government	Outside NGO	Local government
Reference contribution	Yes	Yes in some treatments	Yes

2.2 *The 2005 experiment*

In the first experiment in 2005, the village council had decided to try to build a bridge and that it should be funded by voluntary contributions. A group of three delegated persons visited every household in the village to present the plan to build the bridge and asked for voluntary contributions. Probably in order to persuade villagers and increase contributions, the delegated people showed a list of names, contribution amounts, and signatures of those who had already contributed. The village council did not set the upper contribution limit. The highest contributed amount was 300,000 dong⁴. Since the total contribution was not sufficient for building a concrete bridge, the Village Council decided to build a wooden bridge.

2.3 *The 2009 experiment*

In 2009 we conducted a field experiment in collaboration with an NGO. More exactly, we employed a threshold public good game that concerned the funding of a new bridge for the village. For a detailed description of the experiment and the results, see Carlsson et al. (2010). The main objective of the experiment was to investigate the role of social influence for voluntary contributions to public goods. The authors devised a threshold public good game in which villagers received an endowment from the NGO and had the option of keeping money for themselves or contributing some or everything to the funding of the bridge. In the experiment, identical endowments of 400,000 dong were provided to 200 household subjects. The threshold level was set at 40 million dong, implying that if villagers together would contribute a total of 40 million dong or more, the bridge would be built. The experiment involved five treatments of which one treatment served as a reference case and the other four

⁴ At the time of the experiment, 100,000 dong = 5 USD.

treatments varied in terms of presence of reference contributions and default options. In all treatments, the contributions were anonymous to everybody except the solicitors.

2.4 The 2010 experiment

The experiment in 2009 resulted in the construction of the bridge in 2010 since the total contributions were higher than the threshold. In preparing for the construction, we had a meeting with the head of the village and representatives from the Farmers' Association. At the meeting, we were informed that they planned to ask the villagers to contribute labor to connect the road with the new bridge. We took this opportunity to collect another naturally occurring contribution data set. The construction work required everyone to work together in a short time period. Several specific days were set for this joint work. Two persons from the village council visited the households in the village to invite villagers to contribute labor related to the new bridge. An important difference compared to the previous two experiments is that instead of being asked for monetary contributions, the households were asked for labor contributions. Not all households were asked to make contributions, since some households were not expected to be able to contribute any labor at all, mainly due to old age. In total 19 percent of the households were not asked to make any labor contribution.⁵ At this time, households were not told anything about what others were contributing, so there were obviously no reference points available. We hired an external supervisor to monitor the construction progress and quality, and recorded villagers' labor contributions. Thus, what we observe here is the amount of actual labor contributions and not what they promised when they were asked to contribute.

2.5 Household characteristics

Although we designed only one of the three experiments (the second one regarding the construction of the concrete bridge in 2009), we have data for three different points in time, 2005, 2009 and 2010, for the same subjects. Table 2 reports background statistics, as of 2009, of the households.

⁵ Estimating a binary probit model where the dependent variable is equal to one if they were not asked to contribute, we find, as expected, that small and poor households and households with an old head or a female head were more likely not to be asked. We also find that the probability of not being asked is positively correlated with the contribution in 2005 and negatively with the contribution in 2009.

Table 2. Household characteristics

Variables	Definition	Mean	Std. dev.
Household size	Number of household members	3.84	1.61
No labor	= 1 if household cannot provide labor for community work	0.19	
Age	Age of household head in year	48.9	13.8
Male	= 1 if household head is male	0.63	
Education	Highest level of education attained: 1 = No schooling (5%); 2 = Grade 1-5 (54%); 3 = Grade 6 – 9 (31.5%); 4 = Grade 10 – 12 (9%); 5 = Vocational school and above (0.5%)	2.46	0.76
Monthly income	Monthly household monetary income in hundred thousand dong	18.13	12.78
Use the bridge everyday	= 1 if use bridge everyday	0.19	
Use the bridge 1 – 3 times a week ⁶	= 1 if about 1 – 3 times a week	0.10	
Use the bridge twice a month	= 1 if about 2 times a month	0.17	
Use the bridge once a month	= 1 if about 1 time a month	0.30	
Member of the communist party	= 1 if at least one household member is a member of the communist party	0.10	
Association	= 1 if at least one household member is a member of a local association	0.49	
Rice land	Total size of rice land currently being cultivated; in congs (1 cong = 1/10 hectare)	4.69	3.13

The mean monthly income is around 1.8 million dong per month, which corresponds to about 95 USD per month and less than 1 USD per household member and day. Thus, the households in the study are poor. In addition, their average education level is very low. The average size of land a family is currently cultivating rice on is also rather small, approximately half of a hectare.

⁶ The options for the question regarding the current use of the bridge were: 1 = Every day, 2 = Around two to three times a week, 3 = Around once a week, 4 = Around twice a month, 5 = Around once a month or less, 6 = Currently do not use the bridge at all. Since relatively few answered options 2 and 3, we merged them in the descriptive statistics and in the analysis.

3. Results

3.1 Average contributions in the three experiments

Before looking at the correlations between the contributions, let us briefly look at the average contributions in each of the experiments, as presented in Table 3. Since not all households were asked to contribute labor in the experiment in 2010, we present the contribution statistics both for the whole sample and for the restricted sample of households that had the possibility to contribute in 2010.

Table 3. Descriptive statistics of contribution variables in three experiments

Experiment	Mean	Std. dev.	Share zero	Min	Max
2005 (thousand dong)	39.45	55.80	0.47	0	300
2009 (thousand dong)	270.85	127.52	0.02	0	400
2010 (labor days, whole sample)	0.40	0.85	0.77	0	3.5
2010 (labor days, restricted sample)	0.50	0.92	0.71	0	3.5

By first comparing the monetary contributions in 2005 and 2009, there are strikingly large differences. The average contribution in 2009 was almost seven times as large as in 2005, and while almost everyone contributed something in 2009, almost half of the households chose to free-ride in 2005. While there may be many different explanations to this observation, two clearly stand out: First, contrary to in 2005, the 2009 experiment involved a matching contribution by the involved NGO. Such matching contributions or seed money have been shown to increase voluntary contributions substantially (e.g., List and Lucking-Reiley, 2002; Karlan and List, 2007). Second, and again contrary to the 2005 experiment, the experiment in 2009 contained a windfall endowment provided by the NGO involved in the experiment.⁷

Moving to the 2010 experiment, we can observe that even fewer chose to contribute anything compared to in the 2005 experiment. In 2010, the average contribution of labor was 0.4 labor days per household, which corresponds to about 32,000 dong based on an average daily labor wage of 80,000 dong.

⁷ There are a few studies on the effects of windfall endowments in public good experiments. Cherry et al. (2005) and Clark (2002) find no evidence of a windfall-gain effect on contributions, while Kroll et al. (2007) find significant differences in a public good experiment with heterogeneous endowment.

3.2 Raw contribution correlations between the experiments

As described above, we observe the contributions in each of the experiments at the household level. As a first step, we therefore analyze the simple pair-wise correlations between the three experiments. Remember that we have three observations of contributions to the bridge for each household. We present correlation coefficients for the whole sample and for the restricted sample of households that were able to contribute in 2010. We set the contribution of those who were not asked to make labor contributions to zero when we calculate the correlations for the whole sample. Table 4 presents the pair-wise correlation coefficients.

Table 4. Correlation coefficients, contributions in the experiments

Whole sample (N = 200)			
	Contribution 2005	Contribution 2009	Contribution 2010
Contribution 2005	1.00		
Contribution 2009	0.30***	1.00	
Contribution 2010	0.41***	0.19***	1.00
Restricted sample (N = 163)			
	Contribution 2005	Contribution 2009	Contribution 2010
Contribution 2005	1.00		
Contribution 2009	0.31***	1.00	
Contribution 2010	0.41***	0.23***	1.00

*, **, and *** denote that the coefficient is statistically significant at the 10%, 5%, and 1% levels, respectively.

Despite the large differences in contributions, including in the size of the fraction who did not contribute anything, the correlation coefficients between the three experiments are substantial and in all cases statistically significant at the one percent level. The correlation coefficients are larger the farther apart in time the experiments are, i.e., the coefficient is the largest between 2005 and 2010 and the smallest between 2009 and 2010, although the latter coefficient increases somewhat if we only include households that were able to contribute labor in 2010. Moral licensing and moral cleansing are possible explanations to this pattern, suggesting, respectively, that those who contributed a lot in 2009 for this reason felt less obliged to contribute much in 2010, whereas those who did not contribute anything or contributed very little in 2009 felt obliged to contribute more in 2010. In addition, the experiments in 2009 and 2010 concerned the same concrete bridge, while the one in 2005 concerned the wooden bridge.

3.3 Econometric analysis

Although the strong positive correlation coefficients obtained are interesting per se, one should be hesitant to interpret them as clear evidence of stability of social preferences. Indeed, there are several possible interpretations behind the positive correlations reported above. For example, suppose that there is actually no difference in prosocial preferences among the households, but that the households who use the bridge the most are also willing to contribute the most. Since the households are the same in all experiments, we would obtain a positive correlation between contributions in the three experiments even if there were no differences among the households in terms of underlying social preferences.

One way to deal with this problem is to use regression techniques in order to correct for possible explanatory variables that can be assumed to vary among the households but that at the same time are presumably independent of underlying differences in social preferences. The most obvious variable here is the extent of the use of the bridge.

In this section, we therefore deal with such potential problems by correcting for explanatory variables by means of regression analysis. More specifically, we use multivariate tobit regressions since we have non-negligible shares of subjects who either contribute the full amount or do not contribute at all; hence, we use truncations at both zero and the full amount (except for the 2005 experiment when there was no upper limit). Using a multivariate model we estimate the correlation coefficients of the error terms for each experiment. These error terms are assumed to reflect the part of social preferences that cannot be explained by our explanatory variables used in the regressions. Moreover, simple correlations do not take into account that there were different treatments in the experiment in 2009. In order to deal with these issues, we estimate a multivariate tobit model where three separate equations are estimated simultaneously, allowing for a correlation between the error terms of each of the equations, and the dependent variables contributions are censored.

We present three sets of regressions: In the first set we use no explanatory variables except for an intercept. In the second set we use only variables reflecting the use of the bridge, since these variables presumably vary among the households and at the same time are independent of underlying differences in social preferences. Finally we present a third set, which includes all relevant explanatory variables. In this last set, we thus face the risk of “over-compensation” in the sense that there may exist variables, such as age or income, which are correlated with true underlying social preferences. For example, suppose that all variation

in social preferences is determined by gender. If we then correct for gender in the regressions, we will find that there is no stability of social preferences over time, even though there may perfectly well exist a certain degree of stability in reality (through gender). Yet, as is the case when not including any explanatory variables, it constitutes a natural benchmark case.

Here we focus mainly on the sample of households that had the possibility to contribute labor in 2010. However, we also report the results based on the full sample, where we have hence set the contribution of labor to zero in 2010 for those who were not asked to contribute. As can be observed, the results are almost the same.⁸ Table 5 presents the results for our three sets of multivariate tobit regressions for each experiment separately. In the main text we report the estimated correlation coefficients only, since this of main interest. In the Appendix we report the coefficient estimates for the two models including covariates for the restricted sample.⁹ As seen in Table 5, the pair-wise correlation coefficients are consistently positive, substantial, and statistically significant. Consequently, even when controlling for a number of observable differences among households and the treatment effects, there are strong correlations in behavior between the three experiments.

⁸ We have also estimated a bivariate tobit model where we only include the monetary contributions in 2005 and 2009 based on the full sample of 200 subjects. The results do not differ in any substantial way compared with what we will present in the main text here and are thus not reported, yet are available upon request.

⁹Few of the household characteristics have a significant impact on the contributions in any of the experiments. Furthermore, there is no consistent pattern across the three experiments. The contributions in 2005 are positively correlated with the size of the land and with whether any household member is a member of the communist party. The contributions in 2009 are only positively correlated with the use of the bridge. In addition, some of the treatment dummy variables, not reported here, are statistically significant. The contributions in 2010 are positively correlated with the size of the land, membership in local associations, and use of the bridge and negatively correlated with age of the household head.

Table 5. Estimated pair-wise correlation coefficients between the error terms from multivariate tobit regressions (number of draws = 200), dependent variables are contributions in the three experiments.

	No variables (except intercept)			Only use-the-bridge variables			All variables		
	2005	2009	2010	2005	2009	2010	2005	2009	2010
Treatment dummy variables	No	No	No	No	Included	No	No	Included	No
Experimentalist dummy variables	No	No	No	No	Included	No	No	Included	No
Socio-economic variables	No	No	No	No	No	No	Yes	Yes	Yes
Restricted sample (N = 163)									
2005	1			1			1		
2009	0.29(0.08) ^{***}	1		0.26(0.09) ^{***}	1		0.21(0.09) ^{**}	1	
2010	0.50(0.08) ^{***}	0.31(0.09) ^{***}	1	0.47(0.08) ^{***}	0.27(0.10) ^{***}	1	0.42(0.09) ^{***}	0.21(0.10) ^{**}	1
LR test of independence	45.389			35.181			24.169		
p-value	0.000			0.000			0.000		
Whole sample (N = 200)									
2005	1			1			1		
2009	0.30(0.07) ^{***}	1		0.27(0.08) ^{***}	1		0.22(0.08) ^{**}	1	
2010	0.51(0.07) ^{***}	0.27(0.09) ^{***}	1	0.48(0.08) ^{***}	0.25(0.09) ^{***}	1	0.44(0.09) ^{***}	0.19(0.10) ^{**}	1
LR test of independence	50.439			40.487			27.759		
p-value	0.000			0.000			0.000		

The relative sizes of these coefficients follow expectations in that they are generally the largest when we do not correct for any variables and the smallest when we include the full set of variables. Yet, the differences between when we correct for the use-of-the-bridge variables and when we do not are small. In each set of correlation coefficients, we can also observe that the size is the largest for the experiments where the time distance is the largest, i.e., between the 2005 and the 2010 experiments. These large coefficients are interesting also from the perspective that the units of contributions are very different, i.e., contributed money versus contributed labor time. One possible explanation, when only reflecting on this finding, is that this pattern is due to moral licensing or moral cleansing. Yet, when reflecting over the very similar correlation coefficients between 2005 and 2009 as between 2009 and 2010, despite the large difference in time distance, this explanation appears not to be the major one. Rather, it seems that a time difference of about seven months – the time between the 2009 and the 2010 experiments – may be sufficient to avoid a great deal of moral licensing and moral cleansing effects. Overall, the results support the idea that a substantial part of observed social preferences are stable over time. The results are also broadly consistent, although not directly comparable, with the recent finding of Cesarini et al. (2009), who use twin studies combined with modified dictator experiments in order to determine the extent to which giving is heritable; their best point estimate suggests that genes explain about 20% of the variation among subjects, whereas we find that the correlation coefficients between the error terms in our regressions vary from 0.26 to 0.47, for the case where we correct for the use-of-the-bridge variables, and are all highly significant.

4. Discussion and Conclusions

Using a combination of two natural experiments and a field experiment, we have compared voluntary contributions to a public good, a bridge in rural Vietnam, in a sample consisting of 200 households in a village over a 5 year period. By using a relatively long period, we have been able to avoid the potentially confounding factor due to moral licensing and moral cleansing when measuring the extent of prosocial stability over time. Our preferred specification, the one with only variables for the extent of use of the bridge, suggests that the correlation coefficients between the error terms, reflecting prosocial preferences, for the different experiments in the regression range from 0.26 to 0.47 and are statistically significant. The results suggest that prosocial preferences are at least partly stable over long periods of time.

Are these correlation coefficients large? We argue that they are, although they are clearly far from unity. Indeed, even if social preferences would be completely constant over time, we would observe correlation coefficients well below one. To see this, consider a population divided equally into two types only, selfish and altruistic ones. The altruistic type gives to a charity 20% of the times an opportunity is given, whereas the selfish type never gives anything. Suppose also for simplicity that there is only one type of charity (where we can normalize the contribution possibility to unity). Consider now two charities in a sufficiently long period such that we can ignore moral licensing and moral cleansing effects, and that hence the probability that the altruistic type will give is 20% on each occasion, independently of whether the individual contributed on the previous occasion or not. What correlation coefficients between the contributions to these two charities would arise?

From the definition of the correlation coefficient we have that $\rho = \frac{\text{cov}(x_1, x_2)}{\text{std}(x_1)\text{std}(x_2)} = \frac{E(x_1 x_2) - E(x_1)E(x_2)}{\text{std}(x_1)\text{std}(x_2)} = \frac{0.02 - 0.01}{0.09} \approx 0.11$, where x_i is contribution to charity i .¹⁰ Thus, although we have here a case where the underlying social preferences are completely fixed, the correlation coefficient between the charity contributions is as low as 0.11. The reason for this relatively low value is of course that also the altruistic type often gives zero. In this perspective, the correlation coefficients obtained here are clearly substantial, although we cannot provide a very precise answer to the question of how stable social preferences are over time.

Let us end with some caveats: As is often the case with natural experiments as well as field experiments, the experimental control is far from perfect. Moreover, we have socio-economic data only for one of the years (2005) and have hence been forced in the regressions to implicitly assume that these relative numbers are approximately fixed over the five-year period. Finally, the sample of 200 subjects is rather limited, even though it was limited by the number of households in the village. We encourage further experimental studies in the field in order to test the robustness of our findings.

¹⁰ From our assumptions it follows that $E(x_1 x_2) = 0.5 \cdot 0.2 \cdot 0.2 = 0.02$, $E(x_1) = E(x_2) = 0.5 \cdot 0.2 = 0.1$, and $\text{std}(x_1)\text{std}(x_2) = (\text{std}(x_1))^2 = \text{var}(x_1) = 0.1 \cdot 0.9^2 + 0.9 \cdot 0.1^2 = 0.09$.

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Appendix

Table A1. Marginal effects (standard errors) from multivariate tobit regressions; dependent variables are contributions in the three experiments. Number of observations = 163; number of draws = 200.

	Only use-the-bridge variables			All variables		
	2005	2009	2010	2005	2009	2010
Use the bridge everyday	30.6 (12.6)**	134.3 (29.6)***	0.55 (0.19)***	25.4 (12.4)**	131.0 (29.5)***	0.45 (0.17)***
Use the bridge around 1 -3 times a week	25.5 (15.4)*	93.6 (35.9)***	0.48 (0.23)**	18.2 (15.1)	82.3 (35.7)**	0.49 (0.20)**
Use the bridge around twice a month	-3.1 (13.5)	63.7 (28.6)**	-0.05 (0.22)	-4.0 (13.2)	62.6 (28.3)**	-0.054 (0.19)
Use the bridge around once a month	13.8 (11.4)	21.0 (25.5)	-0.03 (0.18)	9.9 (11.1)	23.3 (25.4)	0.008 (0.16)
Household size				-1.6 (2.9)	8.4 (6.6)	-0.007 (0.04)
Age				-0.04 (0.39)	-0.40 (0.88)	-0.014 (0.01)**
Male				-7.5 (9.5)	10.3 (20.8)	-0.24 (0.13)*
Education				5.1 (5.7)	13.5 (13.3)	-0.11 (0.08)
Monthly income				-0.15 (0.33)	0.82 (0.77)	0.003 (0.004)
Rice land				2.7 (1.3)**	-0.15 (3.1)	0.043 (0.02)**
Member of the communist party Association				24.4 (14.0)*	31.7 (32.8)	0.21 (0.19)
				9.9 (8.8)	30.8 (20.5)	0.22 (0.12)*
Treatment dummy variables	No	Included	No	No	Included	No
Experimentalist dummy variables	No	Included	No	No	Included	No

Paper III

Conditional Cooperation and Disclosure in Developing Countries*

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Abstract

Understanding the patterns behind people's voluntary contributions to public goods is crucial for the broader issues of economic and social development. By using the experimental design by Fischbacher *et al.* (2001), we investigate distributions of contribution types in developing countries – Colombia and Vietnam – and compare our findings with those previously found in developed countries. We also investigate the effect of introducing disclosure of contribution on contribution types. Our experiments show that, on average, the distributions of contribution types are similar both in the two countries and compared to previous findings, except for free-riders, and overall remain unaffected by disclosure of contributions.

JEL classification: C72; C92; H41.

Key words: Conditional cooperation; Disclosure; Experiment; Public Goods.

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1. Introduction

Empirical findings from both field and laboratory experiments on average show that contributions to public goods exceed the zero-level of contribution, which is the predicted contribution of a selfish individual (e.g., Ledyard, 1995; Zelmer, 2003). In recent decades, public goods experiments have been the workhorse to better understand contributions to public goods. One early insight from these experiments was that behind the veil of an on average positive amount being contributed to a public good, there was large heterogeneity in contributions among people ranging from free-riders to people who contribute full endowment to a public good.

To gain some insight on people's contribution behavior when the object is a public good, but also to better understand the dynamics of contributions, it is important to clearly identify the distribution of different types of contribution behavior in a population.¹ An important contributor type that has been identified is the conditional cooperator, i.e., a subject who will contribute an amount similar to what he or she thinks others will contribute.² One approach to empirically investigate conditional cooperation is to explain contribution in the current period with that of others in the previous period; Keser and Van Winden (2000) found a significant and positive relationship between these two components.

Fischbacher *et al.* (2001) developed an alternative examination of types of contributors by using a public goods experiment based on the strategy method. In their experimental design, subjects are asked not only how much they would contribute to the public good as in a standard public goods experiment, i.e., unconditional contribution, but also how much they would contribute conditional on the average amount contributed by the other group members ranging from a zero contribution to the maximum amount, i.e., conditional contributions. Based on the conditional contributions, free-riders are identified as subjects who contribute zero regardless of the contributions made by others, while conditional cooperators are those who increase their contributions as the contributions made by others increases. Free-riders and conditional cooperators are the two dominating types; on average free-riders make up approximately one-quarter of the population, while conditional cooperators comprise about half of the population (e.g., Fischbacher *et al.*, 2001; Fischbacher and Gächter, 2010;

¹ For example Gächter and Thöni (2005) show the effect of matching different types of contributors together on contribution levels over time. Most interesting is their finding that creating homogeneous groups of high contributors result in highly sustained cooperation over time.

² For an early discussion on this in psychological literature, see, e.g., Kelley and Stahelski (1970).

Herrmann and Thöni, 2009; Kocher *et al.*, 2008). In a follow-up paper, Fischbacher and Gächter (2010) show in a within-subject design that the types identified using the strategy method correspond to behavior in a standard multi-period public goods experiment where only unconditional contributions are elicited, supporting the behavioral validity of the strategy method.

A more recent development in public goods experiments is the investigation of behavioral differences and similarities across societies. Most of the knowledge from public goods experiments is based on multi-period experiments in Western Europe and the U.S.³ Yet, Herrmann *et al.* (2008) conduct a standard 10-period public goods experiment in 16 different locations worldwide including Western European countries, China, South Korea, Turkey, Australia, Saudi-Arabia, and Yemen,⁴ and find differences in initial contribution among locations but a similar speed of decay. An interesting question is then whether the distribution of types of contributors is similar across locations. In the original experiment conducted in Switzerland, Fischbacher *et al.* (2001) find that 50% of players are conditional cooperators, whereas approximately 30% are free-riders. The only published study investigating types of contributors using non-Western students that we are aware of is Herrmann and Thöni (2009). By conducting the experiment in several locations in Russia, they find that approximately 50% are conditional cooperators while 5% are free-riders. Our first objective of the present paper is to investigate the distribution of types in two locations where very few published public goods experiments have been conducted, i.e., in Vietnam in Southeast Asia and in Colombia in South America, using the design by Fischbacher *et al.* (2001).⁵

An important related issue is whether there are means to increase and sustain contributions to public goods, and whether these means are equally effective in different locations. Herrmann *et al.* (2008) investigate the effect of introducing the possibility to monetarily punish other group members in their worldwide experiments. The overall effect of introducing punishment was that contributions stayed roughly the same level over all periods, yet the absolute fraction of endowments allocated to the public good differed across locations.

³ In a critical paper, Henrich *et al.* (2010) discuss the use of a subject pool consisting of Western, educated, industrialized, rich, and democratic (WEIRD) societies, but especially using undergraduate students. In a response, Gächter (2010) provides a thoughtful discussion on the choice of subject pool relating to the objective of the research.

⁴ For a more detailed discussion and analysis of culture and cooperation using the same data set, see Gächter *et al.* (2010).

⁵ For previous experiments in Vietnam see e.g., Carpenter *et al.* (2004)

Another possible way to increase contributions is to publicly disclose each individual's contribution to the public good. As discussed in, e.g., Andreoni and Petrie (2004), many situations in daily life contain external interventions such as disclosure of people's contributions to public goods to enhance pro-social behavior. These situations range from public announcements at fundraising events to official reporting of firms' pollution levels. A few public goods experiments have investigated the effect of disclosure on contributions to public goods. Rege and Telle (2004) investigate the effect of disclosure in a one-shot public good experiment where the subjects reveal their own contributions to the other group members. They find significantly higher contributions when contributions are disclosed. Noussair and Tucker (2007), however, find an insignificant effect of disclosure when using a design similar to Rege and Telle (2004), whereas in a multi-period public goods experiment with disclosure they find significantly lower contributions. The second objective of the present paper is to investigate the effect of disclosure of the contribution to the public good on contribution behavior compared to the effect of non-disclosure by using a between-subject design in both Colombia and Vietnam.

We find no significant difference in the proportion of conditional cooperators between the experiments in Colombia and Vietnam or compared to previous experiments in, e.g., Western countries, Japan, and Russia. Yet, we do find some significant differences in the share of free-riders among locations. When we introduce disclosure, we find significantly higher unconditional contributions in Colombia, but the distribution of the main contribution types are similar in the disclosure and non-disclosure treatments.

The rest of the paper is organized as follows: Section 2 presents the experimental design and procedures, Section 3 contains the results, and, finally, Section 4 offers some concluding remarks.

2. Experimental design

We used a linear public good experiment based on the strategy method as developed by Fischbacher *et al.* (2001). Subject i 's payoff in tokens from the public goods experiment is given by

$$\pi_i = 20 - c_i + 0.4 \sum_{j=1}^4 c_j, \quad (1)$$

where c is the amount allocated to the public good. Each group consisted of four randomly matched subjects, where each subject was endowed 20 tokens. Each token earned in the experiment corresponded to 750 COP (Colombian pesos) in Colombia and 6000 VND (Vietnamese dong) in Vietnam. We determined the exchange rate for the tokens in each country so that the average of a payoff for free-riders would be equal to the average earning from a student's part-time job.⁶ The marginal per-capita return (MPCR) from the public good was set to 0.4. For a rational and selfish subject, it is obvious that any MPCR below one results in a dominant strategy to free-ride, i.e., to contribute zero to the public good. However, from a social perspective, it is optimal to contribute the whole endowment because $MPCR * n > 1$. Thus, an MPCR of 0.4 fulfills the requirement for a public good.

Since our experiment was based on the experimental design by Fischbacher *et al.* (2001), we elicited both conditional and unconditional contributions to the public good. In the conditional contribution part, the strategy method was used, i.e., subjects were asked, in what is called the conditional contribution table, how much they would like to contribute to a public good conditional on the average contribution levels (rounded to the nearest integer) of the other group members. In the unconditional part, subjects were asked how much they would like to contribute to a public good, which replicates a standard one-shot public good experiment. In order to make each of the choices incentive compatible, we randomly chose three subjects in each group and let their unconditional contributions count as their contributions to the public good. The payoff-relevant contribution for the fourth subject was based on his or her conditional contribution table, where the amount corresponds to the amount stated conditional on the average unconditional contributions of the other three members. Finally, by adding the three unconditional contributions and the conditional contribution by the fourth member, the total contribution by the group to the public good could be calculated using equation (1). We also asked subjects about their beliefs regarding others' unconditional contribution. As in Gächter and Renner (2010), subjects were rewarded in tokens for accurate guesses of others' contributions.

The subjects were recruited among undergraduate students at Universidad Nacional de Colombia-Sede Medellín in Medellín, Colombia and at Nha Trang University in Nha Trang, Vietnam. Subjects were randomly selected from a list of people who registered in response to

⁶ At the time of the experiment, 1 USD=2,000 COP and 1 USD=17,500 VND. Two of the authors are native speakers of Spanish and Vietnamese, respectively. The English instructions were translated to Spanish and Vietnamese and then back to English to check for accuracy of the translations.

an e-mail invitation to participate in the experiment. We ran two treatments (with two sessions per treatment) in each country. In the no-disclosure treatment, neither the identity of nor the contributions made by the subjects were revealed during or after the experiment. In the disclosure treatment, each subject's contribution and group belonging were disclosed to everyone in the session after all contributions had been submitted. Up to the point of disclosure, there were no differences between the treatments except that the subjects in the disclosure treatment received information about the disclosure procedure in their instructions. At the time of disclosure, the four group members were asked to come together, one group at a time, and sit down on four chairs in front of all other participants. Once the four group members were seated, each subject was asked one at a time by using experimental identification numbers to stand up, whereby his or her payoff-relevant contribution to the public good was publicly announced by the experimenter. All subjects in the disclosure treatments knew about the disclosure procedures in advance since they were clearly described in the instructions to the experiment. Using the chi-square test, we cannot reject the hypothesis of equal distributions of gender and degree of selfishness⁷ at the 5% significance level between the two treatments in each country.

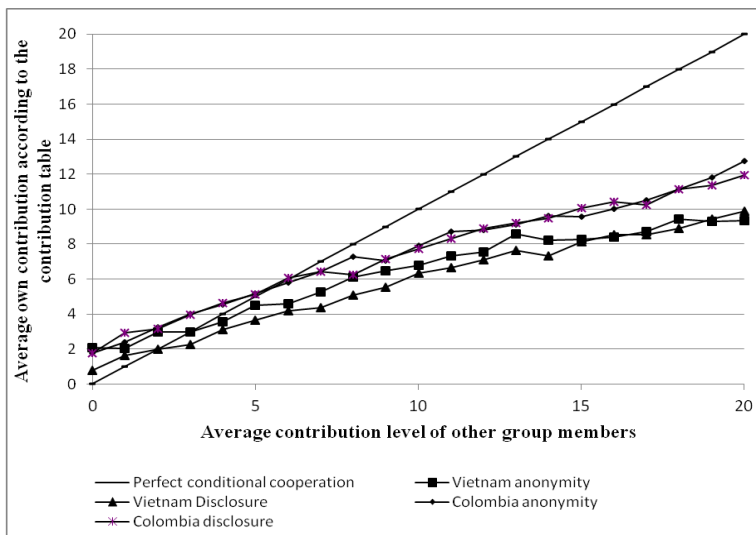
In the beginning of the experiment, instructions were handed out and read aloud to the subjects. The instructions included several examples and exercises, and the subjects were allowed enough time to solve the exercises on their own. Once all participants had completed the exercises, the experimenter solved them in public. Any remaining questions the subjects had were then answered in private. The subjects decided how much to unconditionally contribute to the public good, and filled in the contribution table where they indicated their contribution to the group account given possible average contributions (rounded to the nearest integer) of the other three members of the group. After collecting the decision sheets, the participants were asked in writing about their beliefs regarding the total unconditional contribution levels of the other three participants to the public good account. Finally, the subjects completed a socio-economic questionnaire. The experimenter randomly selected, by using the identification numbers, one member in each group for whom the conditional contribution was the income-relevant decision and then calculated the amount to be paid to each subject. In the case of the disclosure treatments, the contribution-revealing stage was conducted after the collection of the questionnaires. At the end of the experiment, all subjects were paid privately in cash (23,000 COP and 181,000 VND on average).

⁷ We used the Mach-IV test to measure the degree of selfishness (see, e.g., Christie and Geis, 1970).

3. Experimental results

We use the conditional contribution tables to analyze the relationship between a subject's own conditional contribution and the average contribution of the other members in his or her group. In Figure 1, following Fischbacher *et al.* (2001), we plot the relation between the average own conditional contribution (on the vertical axis) and the other members' average contribution (on the horizontal axis). The overall picture is the same across locations and treatments, and shows that people contribute more when the average of others' contributions increases. The slope is less than one, which indicates imperfect conditional cooperation. Moreover, there is a positive average contribution to the public good when others give zero. This can be interpreted as altruism, and exists in both treatments for both countries. These patterns are all consistent with previous studies, e.g., Fischbacher *et al.* (2001), Kocher *et al.* (2008), and Herrmann and Thöni (2009).

Figure 1. Average own contribution level for each contribution level of other group members



Based on the conditional contributions, we categorize subjects into different types of contributors, using the same classifications as in, e.g., Fischbacher *et al.* (2001) and Fischbacher and Gächter (2010). We classify a subject as a *free-rider* if his or her own contribution is zero for all possible average contributions of the other members, while a *conditional cooperator* is someone whose own conditional contribution increases weakly monotonically with the average contribution of the other members. In addition, a subject is

also classified as a conditional cooperator if the relationship between his or her own and others' average contributions is positive and significant at the 1% significance level based on the Spearman rank correlation coefficient. *Hump-shaped contributors* (triangle contributors) show weakly monotonically increasing (or increasing with a Spearman rank correlation coefficient at the 1% significance level) contributions up to a certain level of others' contributions, but beyond this level their conditional contributions decrease based on a reversed classification. The remaining subjects are categorized as *others*.

Table 1 summarizes the distribution of contributors – free-riders, conditional cooperators, hump-shaped, and others – in our four treatments. In addition, we present the shares of subjects classified into the four categories used in Fischbacher *et al.* (2001) (conducted in Switzerland), Herrmann and Thöni (2009) (in Russia), and Kocher *et al.* (2008) (in the U.S., Austria, and Japan). When we compare the no-disclosure treatments, we notice similar distributions between Colombia and Vietnam. Compared to the previously conducted experiments, we have fewer free-riders in Vietnam and Colombia compared to in Switzerland, Austria, and Japan. Moreover, we note that the share of conditional cooperators is stable across locations, with the exception of the U.S.

Table 1. Distribution of contributor types.

	<i>Colombia</i>		<i>Vietnam</i>		<i>Switzerland</i>	<i>Russia</i>	<i>U.S.</i>	<i>Austria</i>	<i>Japan</i>
	<i>The present study</i>		<i>The present study</i>		<i>Fischbacher et al. (2001)</i>	<i>Herrmann & Thöni (2009)</i>	<i>Kocher et al. (2008)</i>		
	<i>No Disclosure</i>	<i>Disclosure</i>	<i>No Disclosure</i>	<i>Disclosure</i>	<i>No Disclosure</i>	<i>No Disclosure</i>	<i>No Disclosure</i>	<i>No Disclosure</i>	<i>No Disclosure</i>
Free-rider	4.2%	12.5%	4.2%	4.2%	29.6%	6.3%	8.3%	22.2%	36.1%
Conditional cooperator	62.5%	75.0%	50.0%	58.3%	50.0%	55.6%	80.6%	44.4%	41.7%
Hump-shape	8.3%	6.3%	8.3%	14.6%	13.6%	7.5%	0.0%	11.1%	11.1%
Others	25.0%	6.3%	37.5%	22.9%	6.8%	30.6%	11.1%	22.2%	11.1%
N	48	48	48	48	44	160	36	36	36

Table 2 shows pair-wise tests of the null hypothesis of equal distribution of contribution types across locations using Fisher's exact tests, whose p-values are presented in Table 2. We first test whether the distribution of contributors is the same in Colombia and Vietnam, and find that we cannot reject the hypothesis. We then conduct the tests to compare Colombia and Vietnam with the previous studies reported above. We find significant differences at the 5% level when we compare with the experiments in Switzerland and Japan, and in the case of Vietnam compared with the U.S. In a more detailed test, we test the hypothesis of equal shares of contributor types across countries. We cannot reject the null hypothesis for

conditional cooperators and hump-shape contributors in any of the pair-wise comparisons between the findings from Colombia and Vietnam and the results reported in Fischbacher *et al.* (2001), Kocher *et al.* (2008), and Herrmann and Thöni (2009) at the 5% significance level. The shares of free-riders in Colombia and Vietnam are similar in size to those found in Russia and the U.S., yet significantly different from the shares found in Switzerland, Austria, and Japan. Thus, the overall differences in distribution of types can be explained by the differences in share of free-riders. Interestingly, overall we find similar patterns of contributor types in Colombia and Vietnam as in the study on Russia by Herrmann and Thöni (2009).

Table 2. Fisher’s exact test of equal share of types in pair-wise comparisons (p-values).

	Colombia- Vietnam	Colombia- Switzerland	Colombia- Russia	Colombia -U.S.	Colombia- Austria	Colombia- Japan
Free-rider	>0.99	<0.01	0.74	0.65	0.02	<0.01
Conditional cooperator	0.30	0.29	0.41	0.09	0.12	0.08
Hump-shape	>0.99	0.51	0.77	0.13	0.72	0.72
Others	0.27	0.02	0.59	0.16	0.80	0.16
Overall	0.59	<0.01	0.85	0.08	0.07	<0.01
	Vietnam- Switzerland	Vietnam- Russia	Vietnam- U.S.	Vietnam- Austria	Vietnam- Japan	
Free-rider	<0.01	0.74	0.65	0.02	<0.01	
Conditional cooperator	>0.99	0.51	0.01	0.66	0.51	
Hump-shape	0.51	0.77	0.13	0.72	0.72	
Others	<0.01	0.38	0.01	0.16	0.01	
Overall	<0.01	0.82	<0.01	0.06	<0.01	

The second focus of the paper is to investigate the effects of disclosure. We begin by testing the null hypothesis of equal distributions of contribution types in the no-disclosure and disclosure treatments using a Fisher’s exact test in each country. We can reject the null hypothesis at the 5% significance level in the Colombian experiment (p-value=0.04), but not in the Vietnamese experiment (p-value=0.42). We perform the pair-wise tests of equal share of types between treatments in each country. The result of the Fisher’s exact test only shows that the share of the “other” type is significantly different at the 5% level in Colombia. The main effect of the disclosure seems to be that the share of the “other” type decreases, which might be explained by the subjects considering their contributions more carefully since they will be revealed in public.

Table 3 shows the average unconditional contributions.⁸ The average unconditional contribution in the no-disclosure treatment is around 39.9% of the endowment in Colombia (7.98 tokens) and 25.8% of the endowment in Vietnam (5.17 tokens). In the disclosure treatment, the average contribution is 48.1% of the endowment in Colombia and 31.9% in Vietnam.⁹ We observe a similar absolute increase in unconditional contribution in percentage points in the two countries: around 8.2 percentage points in Colombia and 6.1percentage points in Vietnam. As shown in Figure 2, introducing disclosure in the Colombian case results in an increase in the proportion of subjects contributing the whole endowment, while in Vietnam there is a shift from a large fraction of contributions below 50% of the endowment to a spike at an unconditional contribution of 50% of the endowment. In an overall test of the null hypothesis of equal distribution of unconditional contributions in the no-disclosure and disclosure treatments, we cannot reject the hypothesis for either country (p-value=0.24 for Columbia and p-value=0.08 for Vietnam) based on the Wilcoxon-Mann-Whitney test.¹⁰

Table 3. Test of equal mean and distribution of unconditional contributions

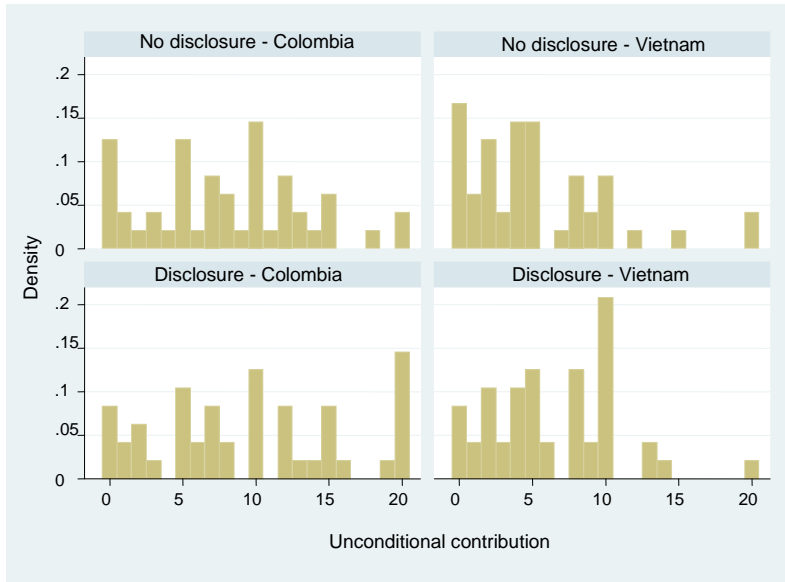
		Country	
		Colombia	Vietnam
Disclosure	No	39.9%	25.8%
	Yes	48.1%	31.9%
H ₀ : Equal distribution of unconditional contributions in treatments		P-value=0.24	P-value=0.08
H ₀ : Equal mean unconditional contributions in treatments		P-value=0.18	P-value=0.20

⁸ We present more detailed descriptive statistics for each treatment and each type of contributor in the Appendix; i.e., share of subjects classified into each category, average unconditional contribution, and guessed average unconditional contribution by others.

⁹ A related issue is whether the unconditional contributions of subjects of a specific contribution type have been affected by the disclosure treatment. To test the null hypothesis of no effect on unconditional contribution between treatments among subjects classified as one specific type of contributor, we conducted a Wilcoxon-Mann-Whitney test. Since we classified subjects into four types in two countries, we conducted eight tests. We could not reject the hypothesis of no difference in unconditional contribution between the treatments in any of the eight tests.

¹⁰ Kolmogorov-Smirnov tests also suggest rejection of the null hypothesis at the 5% significance level (p=0.61 for Colombia and p=0.29 for Vietnam).

Figure 2. Histograms of unconditional contributions per treatment



4. Discussion

The objectives of this paper were to investigate whether the distribution of contribution types in public goods experiments is robust across locations and across treatments when type classification is based on using the experimental design developed by Fischbacher *et al.* (2001). Our results show stability of proportion of conditional cooperator type across locations and treatments, accounting for approximately 50% of the subjects in a population. However, the share of free-riders differs significantly between some locations.

From previously conducted public goods experiments, we know that there is heterogeneity in contributions, and hence the aggregated contributions at group level depend on how individuals are matched into groups. By and large, the large share of conditional cooperators seems to be stable across locations and in our case also across treatments, while shares of other types of contributors vary. This indicates support for the decomposition analyses of determinants of contributions in Gächter *et al.* (2010), which point to the importance of individual and group effects rather than cultural effects in explaining contributions.

The small increase in contributions from our introduction of disclosure is different from the large impacts from other institutions such as monetary punishment (e.g., Fehr and Gächter, 2000; Herrmann *et al.*, 2008). It should however be noted that the previous findings on the effect of introducing disclosure on contributions are mixed (e.g., Rege and Telle, 2004; Noussair and Tucker, 2007). The small positive effect from disclosure may indicate either that disclosure is weak as an instrument to increase contribution or that the motivation to increase contributions, when they are subject to disclosure, e.g., image motivation, is cancelled out with decreased extrinsic motivation.¹¹ The distributions of types are however stable across our treatments. On the other hand, introduction of monetary punishments must result in a changed distribution of types since most individuals contribute a positive amount. Thus, given the stability of proportion of conditional cooperator type found across locations and our treatments, it seems important to better understand what makes individuals change contribution types when institutions such as monetary punishment (e.g., Fehr and Gächter, 2001) and exclusion (e.g., Cinyabuguma *et al.*, 2005) are introduced. Gächter *et al.* (2010) show in the monetary punishment case that differences in contributions are, to an important degree, determined by cultural differences, and thus culture should be one of the focuses in this field of research. Needless to say, future research is needed to investigate the roots of cooperation to be able to better understand observed differences in contributions to various public goods.

¹¹ Although monetary punishment has shown to increase contributions, the overall effect on welfare tends to be negative in earlier periods. However, in a 50 period public good experiment with monetary punishment, Gächter *et al.* (2008) find positive and significant welfare effects. In contrast, disclosure does not incur any monetary costs.

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Appendix. Distribution of contributor types – detailed descriptive statistics.

	Colombia									Vietnam										
	No Disclosure			The present study			Disclosure			No Disclosure			The present study			Disclosure				
	Dist.	Avg. Unc. Cont.	Guess Avg. Unc. Cont.	Dist.	Avg. Unc. Cont.	Guess Avg. Unc. Cont.	Dist.	Avg. Unc. Cont.	Guess Avg. Unc. Cont.	Dist.	Avg. Unc. Cont.	Guess Avg. Unc. Cont.	Dist.	Avg. Unc. Cont.	Guess Avg. Unc. Cont.	Dist.	Avg. Unc. Cont.	Guess Avg. Unc. Cont.		
Free-rider	4.2%	0.5	2.00	12.5%	0.7	3.5	4.2%	10.0	10.0	4.2%	10.0	10.0	4.2%	0.5	0.7	4.2%	7.4	7.4	7.0	
Conditional cooperator	62.5%	9.3	9.5	75.0%	11.6	10.2	50.0%	5.5	6.4	58.3%	5.5	6.4	58.3%	7.4	7.0	58.3%	5.1	5.9	5.2	
Hump- shape	8.3%	8.8	8.3	6.3%	6.7	8.2	8.3%	1.5	5.9	14.6%	1.5	5.9	14.6%	5.1	5.2	14.6%	5.6	5.6	6.3	
Others	25.0%	5.6	6.2	6.3%	7.0	3.4	37.5%	5.1	5.8	22.9%	5.1	5.8	22.9%	5.6	6.3	22.9%	48	48	48	
N		48			48			48			48			48				48		

Dist.: Distribution. *Avg. unc. cont.:* average unconditional contribution. *Guess avg. unc. cont.:* guessed average unconditional contribution.

Paper IV

Social Capital and Private Adaptation to Climate Change: Evidence from the Mekong River Delta in Vietnam

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Abstract

Farmers in developing countries often face capital constraints in adapting to climate change. Can farmers' own social capital be utilized to facilitate the adaptation? This study uses four components of social capital – formal institutions, informal institutions, trust, and cooperativeness – to examine whether social capital is systematically linked to adaptation to climate change. The results suggest, in general, that social capital at the individual level does not affect farmers' private adaptation to climate change. Yet, some forms of social capital are significantly associated with the choice of some particular adaptation measures.

JEL classification: C93; D13; Q54

Key words: *adaptation to climate change, social capital, Vietnam*

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1. Introduction

Climate change is occurring in the low-lying Mekong River Delta of Vietnam (Wassmann *et al.*, 2004; Dasgupta *et al.*, 2007) and households in the area have developed their own adaptation strategies (Chinvanno *et al.*, 2008). Adaptation is an important way in which farmers respond to climate change (Adger *et al.*, 2003; Bradshawn *et al.*, 2004; Barbier *et al.*, 2008). The way in which affected farmers will adapt determines the scale of climate change impacts and hence their farming production and livelihoods. Knowledge of adaptation measures and factors affecting farmer households' portfolio of adaptation is important for policy makers' ability to facilitate relevant conditions for households' adaptation. Previous research on determinants of households' adaptation behavior has mainly focused on perceptions of impacts of climate change (Blennow and Persson, 2009), incentives and the ability to adapt (Hoffmann *et al.*, 2009), and environmental factors (Seo and Mendelsohn, 2008). The role of social capital in adaptation behavior has still not been investigated comprehensively (Pelling and High, 2005).

Chinvanno *et al.* (2008) report that in order to cope with the impacts of climate hazards, rice farmers in the Mekong River Delta in Vietnam have mainly used their own household resources and have concentrated their adaptation actions within their farm boundaries. Faced with limited financial capability, instead of investing in costly defensive efforts such as small scale irrigation, farming households have used alternative adaptation strategies such as adjusting the crop calendar or using alternative crops and seed varieties. Studies on to what extent social capital determines households' choice of these adaptation measures may have distinct policy relevance since available resources such as social capital can be used up given chronic problems of human and financial resource constraints.

We define social capital as social networks and social skills owned by the individual and used to facilitate particular actions.¹ We construct a set of social capital indexes that cover formal and informal social networks, trust, and cooperativeness. The first three social capital indexes are based on survey responses. The measure of

¹ This definition of social capital is in line with studies that view social capital as a person's social characteristics (Glaeser *et al.*, 2002; Carpenter *et al.*, 2004; Karlan, 2005). However, social capital can also be defined as the common property of a group that facilitates collective action for the mutual benefit of group members (Putnam, 2000; Krishna, 2004).

cooperativeness is based on actual behavior of farmers in a public good experiment. We then examine how these social capital indexes are associated with farmers' choice of private adaptation to climate change.²

Social capital is multi-dimensional in nature. We attempt to understand how different dimensions of social capital affect the choice of adaptation measures. A number of qualitative studies have suggested that social capital is critical to adoption decisions in mitigating exposure to climate shocks (e.g., Adger, 2003; Pelling and High, 2005; Wolf *et al.*, 2010). Most previous quantitative studies on the relationship between social capital and adaptation have used groups and networks as indicators for social capital (e.g., Deressa *et al.*, 2009; Di Falco and Bulte, 2009b). Impacts of other dimensions of social capital such as trust and cooperation on climate change self-protection measures remain largely neglected. The present study contributes to the adaptation literature by providing empirical evidence on whether social capital in the form of trust and cooperation affects farmers' adaptation decisions. Almost previous studies have used social capital in the form of a single dimension or an aggregate index and were therefore not able to show how different components of social capital can have different effects on adaptation behavior. We explore how four components of social capital can explain farmers' adaptation behavior.

Our study suggests that in general, social capital at the individual level does not affect farmers' behavior with respect to private adaptation. Some forms of social capital such as formal and informal institutions, however, are weakly associated with the choice of different climate change adaptation measures in farming activities. We find that experimentally-measured social capital in the form of cooperativeness is negatively associated with the choice of private adaptation to domestic water shortage, although the magnitude of the correlation is small.

2. How can social capital affect private adaptation to climate change?

By adaptation we mean any private investment to reduce potential net damage due to climate change.³ Farmers use self-insurance efforts to reduce the adverse effects of

² It can be argued that social networks per se can be a measure of adaptation to climate risk. Households may invest in social relationships, which in turn can act as an informal safety net mitigating the consequences of climate change, for example by risk sharing principles. However, we model social capital as an input in the adaptation process. The treatment of social capital as an adaptation measure is complicated (for example due to endogeneity problems) and is an interesting topic for future research.

climate change if it occurs. An individual's adaptation behavior is triggered by his or her recognition of the need to adapt (Fankhauser *et al.*, 1999), perceived climate risk, costs of adaptation, and potential reduction in damage (Kane and Shogren, 2000). Farmers' assets of social networks and social skills can possibly affect these determinants of their adaptation behavior.

Social networks can facilitate the exchange of information about possible climate change effects, facilitate the diffusion of adaptation innovations, and therefore help reduce adaptation costs. Deressa *et al.* (2009) showed that informal institutions such as peer networks may help increase people's awareness of climate change and its effects and promote sharing of experiences of adaptation options. The authors found that having access to farmer-to-farmer extension, the service in which trained farmers act as the extension agents to the neighboring farmers, can increase the likelihood of using specific adaptation measures such as "different crop varieties" and "planting trees." Social networks can also provide a channel to informal financial sources that relax farmers' credit constraints on investments in adaptation. Individuals' strong social ties can help speed up disaster responses and reduce exposure to external risks (Carter and Maluccio, 2003).

Does trust, a farmer's social skill, affect the choice of private adaptation measures? In the present study, trust is defined, broadly, as a belief that other people are generally trustworthy and as a social orientation toward other people (Glaeser *et al.*, 2000). Trust in information from local organizations can facilitate the recognition and understanding of climate changes. A trustworthy person, or a reciprocal person, is more likely to receive information or help from his or her peer network, therefore trustworthiness⁴ can facilitate the knowledge acquisition and guarantee a safety net that people can rely on to e.g. borrow money or assets in times of climatic variation or weather shocks. There have been, however, no empirical studies on links between trust and the choice of private adaptation measures.

Although social capital can facilitate collective action to overcome social dilemmas in joint adaptation projects, only a few studies have discussed this role (e.g., Adger 2000,

³ This definition is from Kane and Shogren (2000) and Mendelsohn (2000). Adaptation can also refer to actions that take advantage of new opportunities that climate change creates. In the context of this study, however, we ignore this part of the definition.

⁴ Trustworthiness is assumed to imply reciprocity (Fehr and Gächter, 2000; Ostrom and Walker, 2003).

2003). Adger (2000) demonstrated that community social capital in the form of voluntary labor contribution has evolved to facilitate collective adaptation practices such as sea dike maintenance in the absence of governmental supports in Vietnam. It is, however, not clear how a farmer's cooperativeness affects his or her choice of private adaptation measures.

Social capital may have negative effects on adaptation in two different ways: strong social ties may create investment disincentives and strong networks may hinder adaptation through distribution of false information. Di Falco and Bulte (2009b) provided evidence of negative effects of kinship linkages on investment in adaptation. The authors found that the number of kinship links is negatively and significantly associated with the probability to invest in soil conservation. The kin network functions as an informal safety net and thus reduces the need to adapt. The network also contains a sharing norm and therefore reduces the incentives for adaptation. Also Agrawal *et al.* (2008) suggested that strong institutional norms such as the labor sharing norm in farming activities may attenuate the incentive to adopt individual adaptation measures such as crop diversification or migration. Strong social networks may act as a conduit for misperception of the climate change effects – false information is easily spread in a strong network. Wolf *et al.* (2010), for example, suggested that strong bonding networks could potentially raise the vulnerability of elderly people in the UK to the effects of heat waves.

3. The village and its climate change problems

The survey and experiment were undertaken in Giong Trom village in the Mekong River Delta in Vietnam in 2009. Table 1 summarizes the socio-economic characteristics of the sampled households. Most households in the village are engaged in rice farming. A typical farmer's household has around four members, where on average less than three members are in their working age. The average household head 49 years old and has only elementary education. The average size of the land a family is currently cultivating is also small, approximately half of a hectare. The average monthly household monetary income of about 95 USD per month is less than one USD per household member per day. About 30% of the surveyed farmers claimed to be moderately informed about climate change and its impacts. More than 60% of the surveyed farmers believed that climate change will have substantial effects on their farming practices and way of life.

Table 1: Households' characteristics description

Variable	Definition	Mean (std.dev.)
Income	Household monetary income in million dong per month	1.81 (1.27)
Income ratio	Dependence on farming income, i.e., ratio of monetary income from farming over total monetary income	0.35
Labor	Numbers of household members who can provide labor	2.72 (1.45)
Land size	Size of farming lands in "cong" (1 cong=1/10 hectare)	4.68 (3.12)
Age	Age of household head in year	48.90 (13.84)
Education	Highest level of education attained: 1=No schooling (5%); 2=Grade 1-5 (54%); 3=Grade 6 – 9 (31.5%); 4=Grade 10 – 12 (9%); 5=Vocational school and above (0.5%)	2.46 (0.76)
Head	Dummy=1 if household head is male	0.62
Children	Number of children living in household	0.57 (0.75)
Awareness	Level of information about climate change and its impacts: 1=very poorly informed (21%); 2=poorly informed (24%); 3=moderately informed (30.5%); 4=well informed (21%); 5=very well informed (3.5%)	2.62 (1.14)
Belief farming	Dummy=1 if believe that climate change will cause a decrease in rice productivity within the next 20 years	0.68
Belief water	Dummy=1 if believe that climate is changing to such an extent that it will substantially affect the family's ways of life	0.64

The low-lying land of the village is subject to tidal flooding and saltwater intrusion from the coastline and the Mekong River. The village is also vulnerable to tropical storms and cyclones. Rural households within the study site have been severely affected by climate change (Oxfam, 2008) partly because of their dependency on climate-based resources such as domestic water, irrigation water, and soil for cultivation. The impacts of climate change on rice farming in the studied area could be severe in the dry season by the prolonged midseason dry spell (Chinvanno *et al.* 2008) or saline water intrusion

because of sea level rise and low flow in the Mekong River, which can result a reduction of about 25% of rice yield (Khang *et al.* 2008).⁵

4. Measurement of social capital and adaptation choices and econometric approach

4.1 Adaptation variables

The study focuses on private adaptation measures adopted in farming practices and domestic water usage. We separately examine impacts of social capital on each practice. The division is necessary because of crucial differences between these activities: the motivations for adaptation in productive activities may differ from those related to domestic water usage efforts. One practical challenge was to disentangle the responses to the climate stimulus from those linked to other stimuli such as the market, family condition, and public policy. We tackled this by asking farmers to report only measures their family had implemented in response to climate change in the past 5 years. The three questions asked were: “What have you done to adapt to unpredictability of weather and unusual timing of the seasons?”, “What have you done to adapt to longer periods of drought?”, and “What have you done to adapt to saline intrusion?”⁶ Enumerators had a list of possible adaptation options, but to avoid framing bias, they did not present it to the respondents. Instead, the respondents verbally described their adaptation measures and the enumerators checked the corresponding options in the list.

Table 2 presents the statistics of the main adaptation measures.⁷ A household can take several measures in response to climate change. We are able to identify three main adaptive responses in farming practices.⁸ The most common response is “Different planting dates,” which consists of activities such as varying planting or harvesting dates by adjusting planting techniques and use of water and fertilizers to ensure that critical growth stages do not coincide with uncomfortable climate conditions. The “Different

⁵ While Yu *et al.* (2010) projected a decline in rice yield by 4.3- 8.3 percent by 2050 for the whole Mekong River Delta, mainly because of a higher sea level rises and changes in temperature and precipitation.

⁶ To identify adaptation measures adopted in farming practices, enumerators asked these three questions. However, adaptation measures adopted in domestic water usage, they did not ask the question “What have you done to adapt to unpredictability of weather and unusual timing of the seasons?” since unpredictability of weather and unusual timing of the seasons do not affect domestic water usage.

⁷ All these measures are individual, meaning that all implementations, costs, and benefits are made, borne, and gained by individual households.

⁸ The observed adaptation pattern is consistent with Chinvanho *et al.* (2008), who surveyed adaptation measures adopted by farmers in the Mekong River Delta in Vietnam in 2005. The seven-month long rainy season in the studied area allows for flexibility in adjusting the crop calendar. The two-crop cycle allows farmers to be flexible when selecting rice varieties.

varieties or crops” measure is a set of activities such as growing a number of different crops to reduce the risk of crop failure or using several varieties that are drought-tolerant or resistant to saline water. “Changing management practices” includes activities such as changing the use of capital, labor, chemicals, and fertilizers, or increasing the use of water conservation techniques. For domestic water issues, the climate change problems of the studied area relate mainly to the shortage of water in the dry season because of a prolonged drought period and intrusion of saline water. Villagers respond to the pressure by investing more in water storage equipment or changing water use practices.

Table 2: Main adaptation measures

Variables	Description	Mean
<i>Farming practices</i>		
Different planting dates	Dummy = 1 if adopted “Different planting dates” measure; 0 otherwise	0.60
Different varieties or crops	Dummy = 1 if adopted “Different varieties or crops” measure; 0 otherwise	0.43
Changing management practices	Dummy = 1 if adopted “Changing management practices” measure; 0 otherwise	0.40
<i>Domestic water usage</i>		
More water storage	Dummy = 1 if adopted “More water storage” measure; 0 otherwise	0.74
Changing water use practices	Dummy = 1 if adopted “Changing water use practices” measure; 0 otherwise	0.51

4.2 Social capital indicators

We define social capital as the social networks and social skills possessed by individuals and used to facilitate particular actions. In particular, social networks or associational social capital are defined as a person’s social relationship that enables him or her to benefit from interactions with others. Social skills, or behavioral social capital (Carpenter *et al.*, 2004; Grootaer *et al.*, 2004), are propensities of individuals to trust and cooperate with other individuals for mutual benefits. We use four indexes to reflect the multidimensional concept of social capital: a formal institution index and an informal institution index as associational social capitals, and a trust index and a cooperativeness index as behavioral social capital. We conducted a survey to measure social capital in the form of social networks and trust, and an economic experiment to measure social capital in the form of cooperativeness. We also used the survey to collect data on adaptation

measures, farmers' awareness of and beliefs about climate change, and socio-economic characteristics of the farming households.

Formal institution index

The formal institution index captures the extent of a household member's participation in various types of non-governmental local organizations.⁹ A person's participation in formal institutions may help him or her access formal information on climate change or new adaptation technologies. The diversity of membership, i.e., the number of formal associations participated in by family members, is used as a proxy indicator for formal institution in the estimation of adaptation in domestic water usage, whereas membership in the Farmers' Association is used as a proxy indicator for formal institution in the estimation of adaptation in farming practices.

Informal institution index

We use the size and usefulness of the network to proxy informal institution (Grootaer *et al.*, 2004). We asked a question addressing the size of the network, "About how many close friends do you have these days? These are people you feel at ease with, can talk to about private matters, or call on for help," and a question to assess the usefulness of the network, "If you suddenly needed a small amount of money enough to pay for expenses for your household for one week, how many people beyond your immediate household could you turn to who would be *willing* to provide this money?" The answers to the question on the usefulness of the network strongly correlate with number of close friends in the question on the size of the network, so we decided to choose the number of close friends as an indicator of informal institution in the econometric analysis.

Trust

We measure trust based on respondents' level of agreement on a 5-point scale with each of the following statements: "Most people who live in this village can be trusted," "Most people in this village are willing to help if you need it," and "In this village, people generally do not trust each other in matters of lending and borrowing money." The first statement focuses on generalized trust and the other two on the extent of trust in the

⁹ Formal institutions in the surveyed area include the Farmers' Association, the Women Association, the Red Cross, the Veterans' Association, the Elderly' Association, the Youth Union, and microcredit and religious groups.

context of specific transactions. Later in the econometric analysis, since these three indexes of trust are strongly correlated and yield similar results, we only report generalized trust, i.e., responses to the statement “Most people who live in this village can be trusted.” Trust in this study, therefore, implies a generalized trust in people living relatively nearby.

Cooperativeness

Cooperativeness in this study can be understood as the degree to which a participant in an experiment contributes voluntarily to the provision of public goods. To measure social capital in the form of cooperativeness, we use results of the natural field experiment in Carlsson *et al.* (2010). The experiment concerned funding a bridge for the village, devised as a threshold public good experiment in which villagers received an endowment from us and could opt to either keep the money or contribute some or everything to the bridge. There are about 200 households on both sides of the bridge that would probably benefit from the concrete bridge construction. They were all included in the experiment.

The public good experiment presents a social dilemma for the participating households since they have monetary incentives to free ride on the contributions of others. In standard public good experiments, contribution levels are normally considered as measurement of the cooperative behavior of participants. In the experiment, we need to control for heterogeneous demands for the public goods and for different contextual factors. We therefore construct the cooperativeness variable by running a regression on actual contributions against experimental context factors and household traits; see equation (1). Residuals of the regression, which equal actual contributions minus predicted contributions, will contain all components of the cooperation behavior. We use the residual values ¹⁰ as a measure for cooperation behavior or cooperativeness ($\hat{\varepsilon}$ in equation (2)).

$$x_i = \alpha + \beta G_i + \varepsilon_i \quad (1)$$

$$\hat{\varepsilon}_i = x_i - \hat{x}_i \quad (2)$$

where x_i is the contribution of household i in the experiment and G_i is a set of parameters controlling for the contexts of the experiment such as treatments, experimenters, and days

¹⁰ To be consistent with other social capital indicators in the analysis, we rescaled the residual values into a range from 0 to 10.

of the experiment and for the socio-economic characteristics of household i . Included in G are variables representing household i 's demand for the public good in the experiment. The full list of variables in (1) and their parameters can be seen in the Appendix. The descriptive statistics of social capital indicators and their correlations can be seen in Tables 3 and 4.

Table 3: Descriptive statistics of social capital indicators

Variables	Description	Mean	Std. dev.	Min	Max
Formal institution					
Number of institution	Number of formal associations participated in by family members	0.91	1.09	0	6
Farmers' Association	Dummy = 1 if a member of the household is a member of the Farmers' Association	0.12	0.32	0	1
Informal institution					
Trust	Number of close friends	3.91	5.05	0	40
	Trust in people who live in the same village	3.18	1.21	1	5
Cooperativeness (scaled)	Scaled cooperativeness	5.50	2.28	0	10
Cooperativeness (raw)	Contribution residuals before scaled	-8.4e-07	111.56	-269.82	220.36

Table 4: Correlation coefficients of social capital indicators

	Number of institution	Famers' Association	Informal institution	Trust	Cooperativeness (scaled)	Cooperativeness (raw)
Number of institution	1.00					
Farmers' Association	0.36	1.00				
Informal institution	0.19	0.08	1.00			
Trust	0.07	0.07	0.07	1.00		
Cooperativeness (scaled)	-0.12	0.03	0.01	-0.12	1.00	
Cooperativeness (raw)	-0.12	0.03	0.01	-0.12	1.00	1.00

4.3 Sampling and econometric approach

Our data is a combination of experimental data and survey data. Subjects who participated in the economic experiment were also respondents in the survey. The experiment and the survey were conducted with all 200 households in the village.

As discussed in Section 2, an individual's adaptation behavior is determined by his or her knowledge of impacts of climate change and adaptation technology, perceived climate risk, costs of adaptation, and potential damage reduction. We can express the relationship in the simple model: $x^j = f(K^j, z^j, e)$, where x^j is the adaptation level of farmer j , K^j is his or her knowledge function, z^j represents the farmer's ability to adapt, which implies a cost of adaptation, and e is an environmental factor. In turn, knowledge is a function of social capital and other socio-economic characteristics $K^j = g(sc^j, s^j)$,¹¹ and ability to adapt is also a function of social capital and household characteristics $z^j = h(sc^j, s^j)$. Combing the equations yields a reduced form $x_j^* = f(sc^j, s^j, e)$.¹² We assume that the functional form of x is linear in the explanatory variables and that the error term ε^j is identically and independently distributed as the normal distribution over the population, i.e.,

$$x^j = \alpha + \sum_{i=1}^4 \beta_i sc_i^j + \sum_{i=1}^8 \gamma_i s_i^j + \varepsilon^j \quad . \quad (3)$$

We estimate two models: one for adaptation in farming practices where the dependent variables are “Different planting dates,” “Different varieties or crops,” and “Changing management practices” and one for adaptation in domestic water usage where the dependent variables are “More water storage” and “Changing water use practices.” In each model, we estimate two sub-models: a model with social capital variables as shown in equation (3) and a model with awareness and belief variables replacing social capital variables. The purpose of the second sub-model is to confirm the robustness of results in the first sub-model through the direct effects of knowledge on adaptation behavior.

We estimate the models using a multivariate probit model, which allows unobserved disturbances in adaptation measures to be freely correlated by simultaneously modeling different adaptation choices as a function of a common set of explanatory variables.¹³

¹¹ See Isham (2002) for a detailed model on how social capital enters in knowledge functions.

¹² Climate-related variables such as temperature and salinity can be inevitable arguments in the adaptation function. We, however, will not include these variables in the regressions since the sampled households in this study are in the same village and have relatively similar climate conditions.

¹³ A binary choice model such as a probit or a logit model may be used. Each adaptation measure is modeled individually as discrete choice dependent variables and acts as a function of a set of explanatory variables. The approach is based on the assumption that discrete choices are competing, i.e., a farmer cannot choose two adaptation measures at the same time. Table 2, however, shows that a farmer household can choose more than one measure, so a binary choice model may not be appropriate.

5. Results

Table 5 provides estimated results of multivariate probit models for farming practices, and Table 6 is for domestic water issues.^{14, 15} To quantify the marginal effects of each social capital indicator and other explanatory variables on each of the unconditional probabilities of adaptation, we use the formula $\partial E(y_i|\mathbf{x})/\partial x_j = \varphi(\mathbf{x}'\widehat{\beta}_i) \times \widehat{\beta}_{ij}$ (Greene 2003, p. 668), where φ is the univariate standard normal density function and $\widehat{\beta}_{ij}$ is the coefficient estimate of variable x_j on each adaptation measure y_i . Standard errors of marginal effects are calculated using the delta method. To gain insight on cross-adaptation relationships, we also calculated marginal effects of the explanatory variables on joint and conditional probabilities of adaptation. The estimated marginal effects are not consistently different from those for the unconditional probability. For the sake of simplicity, we do not report the marginal effects of the cross-adaptation.¹⁶

The bottom part of Table 5 shows that all correlation coefficients between each of the three adaptation measures in farming practices are statistically significant, positive, and substantial in both model 1 and model 2, suggesting that the null hypothesis of independence across error terms of the three latent equations can be rejected. Specifically, in model 1, the error terms for “different planting dates” and “different varieties and crops” have the correlation coefficient of 0.52; for “different planting dates” and “changing management practices” it is 0.41 and for “different varieties and crops” and “changing management practices” it is 0.33. The significant correlation coefficients also mean that unobservable factors that increase the probability of adapting “different planting dates” also increase the probability of adapting “different varieties or crops” or “changing management practice.”

¹⁴ We also estimated univariate probit models for each of the adaptation measures. We then use the log-likelihood values of the multivariate and univariate probit models to do likelihood ratio tests and cannot reject the hypothesis of error correlations ($\chi^2(3)=42.71$, p-value<0.001, and $\chi^2(3)=12.54$, p-value<0.005, for the multivariate models for farming practices and domestic water in Tables 5 and 6).

¹⁵ For each model, we first estimate a model with all forms of social capital and then another model without social capital in the forms of institutions and trust that could be correlated with the cooperativeness. The results are similar in two regressions so we only report results of the full model, which contains all social capital indicators. Correlation coefficients of social capital indicators can be seen in Table 4.

¹⁶ The estimated marginal effects can be provided upon request.

Table 5: Multivariate probit estimate of adaptation in farming practices

Dependent variable	Model 1			Model 2		
	Different planting dates	Different varieties or crops	Changing management practices	Different planting dates	Different varieties or crops	Changing management practices
	Marg. effect (std. err.)	Marg. effect (std. err.)	Marg. effect (std. err.)	Marg. effect (std. err.)	Marg. effect (std. err.)	Marg. effect (std. err.)
<i>Social capital</i>						
Farmers' Association	0.164 (0.131)	0.243** (0.121)	0.018 (0.124)	-	-	-
Informal institution	-0.011 (0.008)	-0.009 (0.008)	0.020** (0.009)	-	-	-
Trust	0.027 (0.033)	-0.027 (0.033)	0.026 (0.033)	-	-	-
Cooperativeness	-0.030* (0.017)	-0.017 (0.017)	-0.025 (0.017)	-	-	-
<i>Awareness and beliefs</i>						
Awareness	-	-	-	-0.010 (0.036)	0.028 (0.036)	0.010 (0.035)
Belief farming	-	-	-	0.013 (0.085)	0.207** (0.086)	-0.044 (0.082)
<i>Socio-economic characteristics</i>						
Income ratio	0.390** (0.152)	0.198 (0.152)	0.288* (0.147)	0.287* (0.147)	0.176 (0.151)	0.261* (0.145)
Income	0.057 (0.035)	0.017 (0.033)	0.027 (0.033)	0.043 (0.033)	-0.002 (0.033)	0.029 (0.032)
Land size	-0.009 (0.015)	-0.023 (0.016)	-0.007 (0.015)	-0.001 (0.015)	-0.021 (0.016)	-0.005 (0.015)
Labor	0.070** (0.030)	0.096*** (0.029)	0.015 (0.029)	0.076*** (0.029)	0.110*** (0.030)	0.017 (0.028)
Age	0.004 (0.003)	0.005 (0.003)	0.004 (0.003)	0.004 (0.003)	0.006* (0.003)	0.003 (0.003)
Education	0.099* (0.059)	0.097* (0.057)	-0.005 (0.056)	0.094 (0.057)	0.072 (0.055)	0.033 (0.055)
Head	0.001 (0.083)	-0.102 (0.083)	-0.045 (0.083)	-0.012 (0.084)	-0.135 (0.086)	-0.052 (0.083)
$\rho_{12} = 0.524***$				$\rho_{12} = 0.545***$		
$\rho_{13} = 0.407***$				$\rho_{13} = 0.392***$		
$\rho_{23} = 0.332***$				$\rho_{23} = 0.317***$		
Likelihood ratio test of dependence:			33.026			34.211
p-value:			0.000			0.000
Number of obs. = 182						
Number of draw = 200						

The multivariate probit estimation results show that social capital in various forms does not explain adaptation to climate change. The formal institution index, i.e., participation in the Farmers' Association, is not associated with choosing "different planting dates" and "changing management practices." The informal institution index does not explain the choice of "different planting dates" and "different varieties and crops." Trust does not affect the choice of adaptation measures either. Social capital in the form of cooperativeness does not influence the likelihood of farmers choosing a

specific adaptation measure in their farming activities. However, we still observe that the “different varieties or crops” measure is more likely among farmer households who belong to the Farmers’ Association; i.e., they possess more social capital in the form of formal institution. The average marginal effect suggests that if family members join the Farmers’ Association, the probability of adopting “different varieties or crops” increases by approximately 24%. Households that possess more informal social capital are more likely to adopt the “changing management practices” measure. For each additional friend that family members have, the probability of adopting “changing management practices” increases by approximately 2%.

The choice of adaptation measures in farming activities is statistically significantly associated with several socio-economic characteristics of farmers’ households. Adoption of “different planting dates” and “changing management practices” such as change in use of fertilizer or pesticide is more likely among farmers who depend on income from farming activities to a large degree. The number of available laborers in the household positively and significantly affects the likelihood of choosing “different planting dates” and “different varieties or crops.” For each additional laborer in a household, the probability of adopting “different planting dates” and “different varieties and crops” increases by approximately 7% and 10%, respectively. Education level of the household head has a positive and significant impact at the 90 percent confidence level on the likelihood of choosing “different planting dates” and of choosing “different varieties and crops.”

The pattern of the results of model 2, where the social capital variables are replaced with awareness and belief variables, is similar to the results of model 1. In general, knowledge variables do not influence the choice of adaptation measures. Only the belief variable is significantly associated with the “different varieties or crops” measure. More specifically, if farmers believe that climate change will cause a decrease in rice productivity within the following 20 years, their households are more likely to adapt the “different varieties or crops” measure. The magnitude of the effect is close to the effects of membership in the Farmers’ Association on the choice of “different varieties or crops” in model 1.

Table 6 reports multivariate probit estimation results for adaptation related to domestic water shortage. The estimated correlation coefficients, i.e., unobserved factors

influencing the decision to adopt “more water storage” and “changing water use practices,” are significantly correlated at the 5% level in both model 1 and model 2. The correlation between these unobserved factors is positive and statistically significant, implying that the unobserved factors that increase the probability of adopting “changing water use practices” will also increase the probability of adopting “more water storage” or vice versa. The correlation also suggests that multivariate probit is a better model for the domestic water issue data.

Table 6: Multivariate probit estimate of adaptation in domestic water usages

Dependent variable	Model 1		Model 2	
	More water storage	Changing water use practices	More water storage	Changing water use practices
	Marg. effect (std. err.)	Marg. effect (std. err.)	Marg. effect (std. err.)	Marg. effect (std. err.)
<i>Social capital</i>				
Number of institutions	0.025 (0.035)	-0.011 (0.039)	-	-
Informal institution	0.003 (0.007)	0.008 (0.008)	-	-
Trust	0.001 (0.025)	0.019 (0.031)	-	-
Cooperativeness	-0.035** (0.014)	-0.016 (0.017)	-	-
<i>Awareness and beliefs</i>				
Awareness	-	-	0.015 (0.029)	0.046 (0.034)
Belief water	-	-	-0.006 (0.068)	-0.054 (0.081)
<i>Socio-economic characteristics</i>				
Income ratio	-0.028 (0.112)	-0.214 (0.136)	-0.060 (0.112)	-0.203 (0.137)
Income	0.033 (0.031)	-0.010 (0.034)	0.033 (0.031)	-0.016 (0.033)
Land size	0.001 (0.012)	-0.001 (0.014)	0.004 (0.012)	-0.001 (0.014)
Labor	0.029 (0.024)	0.017 (0.027)	0.033 (0.024)	0.018 (0.027)
Age	0.001 (0.003)	-0.000 (0.003)	0.001 (0.003)	-0.001 (0.003)
Education	0.059 (0.050)	0.015 (0.055)	0.060 (0.049)	0.029 (0.054)
Head	-0.017 (0.067)	-0.025 (0.080)	-0.019 (0.067)	-0.034 (0.080)
Children	-0.043 (0.045)	-0.154*** (0.055)	-0.035 (0.045)	-0.153*** (0.054)
		$\rho_{12} = 0.303^{**}$	$\rho_{12} = 0.304^{**}$	
Likelihood ratio test of dependence:		5.932	6.261	
p-value:		0.015	0.012	
Number of obs. = 200		Number of draw = 200		

Most of the social capital measures cannot explain the choice of adaptation measures related to domestic water shortage problems. However, cooperativeness is

negatively associated with “more water storage” at the 5% level. Choosing this adaptation measure is less likely among farmer households with a higher propensity to cooperate. The estimated marginal effects suggest that on a 10-unit scale, for every 1 unit increase in cooperativeness the probability of adopting the “more water storage” measure decreases by approximately 3.5%. Most of the socio-economic variables have insignificant impacts on the likelihood of adopting a measure, yet number of children is negatively associated with “changing water use practices.” In model 2, neither knowledge variable is associated with choice of adaptation measures, confirming the results for model 1: The forms of social capitals that are expected to facilitate knowledge accumulation do not influence private adaptation.

6. Discussion and conclusion

Our study suggests that social capital at the individual level generally does not affect farmers’ private adaptation to climate change. We, however, do observe that some forms of social capital are associated with some particular adaptation measures in farming activities and in domestic water issues. The magnitudes of these significant social capital coefficients are small, except the effect of Farmers’ Association membership on “Different varieties or crops.”

Our findings raise a question: Why do a number of social capital measures not explain the choices farmers make with respect to private adaptation measures? As discussed in Section 2, the main roles of social capital in private adaptation are to facilitate information transfer and labor/financial transfer. We argue whether these roles depend on the nature of adaptation measures. If the adaptation requires only low-end technology or less effort, social capital may not be an important factor. Our research results support this argument. Saline intrusion that affects household’s domestic water usage is relatively easy to detect. Implementation of adaptation measures such as “more water storage” and “change water use practices” is not a matter of high-end technology such that a household relies on a formal organization for instructions or needs a friend network to confirm the reliability of the measure. In addition, these adaptation measures require only limited labor and money. In farming practices, since the “changing varieties or crops” measure may require some special expertise, formal institutions appear to play a role. “Changing management practices,” which involves changes in the use of capital and labor, may require the ability to network to share capital and labor – in our case

proxied by the number of close friends. Otherwise, social capital in the form of formal and informal institutions does not play an important role in private adaptation.

We also show that trust, defined in this study as the extent to which one trusts people in general, is not associated with farmers' choice of any private adaptation measures in farming practices or in domestic water issues. We propose some reasons for the rejection of the null hypothesis that trust can facilitate both the recognition of changes in the climate and an understanding about climate risk. The choice of adaptation measures is a process that depends on the recognition of the need to adapt, the incentive to adapt, and the ability to adapt (Frankhauser *et al.*, 1999). The recognition element of the adaptation decision, where trust is hypothesized to play a role, is empirically proven to be affected by social capital in the form of social networks. Since networks and trust seem to be associated, possible effects of trust on the adaptation decision become blurred. In addition, whether trust is associated with adaptation also depends on the nature of the adaptation measures. Besides the role of trust or cooperation in the recognition element, the propensity to trust and cooperate is often needed for joint adaptations. In the present study, adaptation investments in farming practices are undertaken to secure private income. It is privately rational to respond to climate change also in the absence of social skills such as trust and cooperation. As the present study does not measure trustworthiness, the relationship between trustworthiness and the choice of private adaptation is open for future research.

Empirical research related to collective action and climate change adaptation has suggested that cooperation is necessary for joint adaptation measures to occur (Adger, 2003). So far, however, there has been little discussion about the role of cooperativeness in individual adaptation choices. We show evidence that a farmer's higher propensity to engage in cooperation, which is measured by a public good experiment, in some specific contexts can deteriorate the likelihood of choosing an individual adaptation measure; in our case it slightly reduces the probability of adopting the "more water storage" measure in response to domestic water shortage due to a salinity problem. In our specific case, we observe that joint adaptation solutions to the problems of domestic water shortage can potentially be achieved by using collective action to build a common water storage tank or to dig to find water for a public well.¹⁷ We argue that a person with a higher

¹⁷ The village's ground water geology makes private wells almost impossible to build due to high costs.

cooperativeness index may have a stronger belief in joint adaptation solutions and therefore reduce investments in private measures. Our measure of cooperativeness is context free since we took out the experimental context effects such as the effects of treatments and demand for the public good when constructing the cooperativeness index. The result is in the line with a set of empirical evidence about adverse effects of social capital on economic behavior (Anderson and Francois, 2008; Baland *et al.*, 2009; Di Falco and Bulte, 2009a, b). While these studies elaborated the concept of “extended family,” which is one of the key components of social capital in developing countries, our results provide evidence regarding another key form of social capital – individuals’ propensity to engage in cooperation. However, these negative sides of social capital do not imply that it is useless in adaptation management processes. It clarifies to policy makers which types of incentives to use in attempting to cope with future changes in climate. For example, in villages where villagers are prone to engage in collective action, i.e., they have a high propensity to engage in cooperation, incentives should target joint adaptation measures rather than private solutions.

Although private adaptation is a key measure in dealing with climate change, this paper’s findings do not support the arguments for developing rural institutions in order to enhance private adaptation to climate change in rural Vietnam, especially with low-end adaptation technologies.

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Appendix: OLS estimate of equation (1)

Variable	Coeff.	P-value
High social information (treatment dummy)	-15.45	0.58
Low social information (treatment dummy)	-66.37	0.02
Default at full contribution (treatment dummy)	-19.35	0.48
Default at zero contribution (treatment dummy)	-53.59	0.06
Household size (number of people living in the household)	5.21	0.38
Age (age of household's head)	0.12	0.87
Education (years in school of household's head)	15.89	0.25
Income (household monetary monthly income in million dong)	8.10	0.30
Land size (size of farming land in "cong", 1 cong = 1/10 hectare)	0.93	0.76
Communist party member (=1 if being a member, 0 otherwise)	32.59	0.31
Association (=1 if a member in an association, 0 otherwise)	12.78	0.52
Gender of household head (=1 if male)	-7.58	0.68
Use the bridge (=1 if everyday)	118.65	0.00
Use the bridge (=1 if maximum 3 times a week)	81.37	0.02
Use the bridge (=1 if 2 times a month)	65.12	0.02
Use the bridge (=1 if 1 time a month or less)	32.35	0.19
Day of experiment (treatment dummy)	-15.88	0.41
Constant	107.44	0.14
Experimenter dummy variables	Included	Included
No. of obs.	200	
Adj. R2	9.35%	

Paper V

Are Vietnamese Farmers Concerned with their Relative Position in Society?

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ABSTRACT *This paper examines the attitude towards relative position or status among rural households in Vietnam. On average, respondents show rather weak preferences for relative position. Possible explanations are the emphasis on the importance of equality and that villagers are very concerned with how the local community perceives their actions. We also investigate what influences the concern for relative position and find, among other things, that if anyone from the household is a member of the Peoples Committee then the respondent is more concerned with the relative position.*

I. Introduction

Despite the fact that prominent economists such as Smith, Keynes and Scitovsky discussed the importance of status and relative income, the interest in empirically testing these issues in economics is relatively recent. A number of recent tailor-made empirical studies have shown that people do have preferences for relative position or status, with respect to both income and consumption (see for example, Solnick and Hemenway, 1998; Johansson-Stenman et al., 2002; Carlsson et al., 2003; Alpizar et al., 2005). Similarly, studies have shown that relative income has a positive influence on self-reported happiness (for example McBride, 2001; Ferrer-i-Carbonell, 2004). In this paper, we extend this literature by empirically investigating the preferences for relative position among farmers in a rural province in the south part of Vietnam. In our study, we ask the respondents to make pair-wise choices between different hypothetical investment opportunities. These opportunities differ in the outcomes for themselves as well as for the other people in their village. Applying the survey approach introduced by Johansson-Stenman et al. (2002), we obtain the marginal degree of positionality within an interval.

Many previous empirical studies on status or relative position have been conducted in western European countries and the USA. A country such as Vietnam

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differs in many respects from the aforementioned countries. Vietnam is a much poorer country: in 2002, it was ranked 151st in the world based on adjusted gross national purchasing power parity income per capita.¹ However, the most interesting aspect is perhaps not the low income level per se but, that Vietnam's political system is radically different from any in the West. Vietnam is a communist society in which the idea of equality forms the basis for many of the country's policies. Bowles (1998) argued that markets, and other economic institutions, influence the evolution of our values and tastes. Thus, individuals' perceptions of factors such as equality and status are affected by the society where they live. Hence, we expect the preferences for relative position or status to be lower in Vietnam than in the West since the idea of equality is widely spread because of its political importance.² The objective of this paper is to investigate preferences for relative position among Vietnamese farmers. From a policy perspective, the question about concern for relative position is important since goods for which there are relative concerns are over-consumed. Then there are efficiency gains by having higher taxes on goods which are more positional (for example Frank, 1985); and see Boskin and Sheshinski (1978) and Ireland (2001) for a discussion of optimal income taxes if income is positional but leisure is not.

The Communist Party of Vietnam was established in 1930, and in 1945 the Democratic Republic of Vietnam was established in what is today the northern part of Vietnam. During the period 1945–75, the Democratic Republic of Vietnam changed its political system towards a Marxist-Leninist system. This political system was introduced to the whole of Vietnam (the Socialist Republic of Vietnam) after the unification in 1975, which resulted in a sharp change of direction for the capitalist-oriented economy in southern Vietnam. A decade later, after a period of stagnation in the economy, the so-called *Doi Moi* (renovation) started in 1986 initiated by the Communist Party.³ Before the introduction of *Doi Moi*, agricultural activities were organized in cooperatives with an egalitarian distribution principle, which ensured a low level of inequality among farmers on the countryside (Nam, 2001). However, the proportion of farmers belonging to cooperatives differed between the north and the south of Vietnam. In 1986, around 95 per cent of farmers in the north of Vietnam were members of a cooperative measured at the regional level. The highest number of farmers belonging to cooperatives in the south was 89 per cent in the Central Coast while only six per cent of the farmers were organised in collectives in the Mekong Delta (Pingali and Xuan, 1992). In the late 1980s, collective farming was abandoned, and land use rights were allocated to farming households during the large land reform. The allocation of land was decentralised to local level politicians. Despite potential incentive problems when allocating, Ravallion and van de Walle (2004) found small effects on income inequality and a substantially improved situation for the poor after the land reform.

Despite the fact that Vietnam has recently shifted towards a market-oriented economy, it may still be expected that the ideas of equality affect people's preferences. Them (1997) argues that the relationship among Vietnamese people to a large extent involves respect towards other people in the community, especially in rural areas. For example, in any major decision-making process, people are concerned with how the other individuals will respond to their actions. When there is an event such as a funeral, harvest or construction in the neighbourhood, they feel

that it is their duty to participate. The reason for such consciousness is perhaps historical, since they often had to struggle for their survival in an environment that was often left without any significant help from the district officials or the government. (See for example Scott (1976) for an interesting and extensive discussion on the relationship between social norms in a village and the concern for the relatively poor.) Our experience from discussing with the villagers throughout the survey is also that people are aware of the earnings of other families in the village. The economy has been monetised to a large extent, and there is not much sharing within the village. A consideration for equality and what others think might explain why Carpenter et al. (2004) found very high levels of contribution in a public good experiment conducted in Ho Chi Minh City, in comparison with experiments in the USA and Western European countries.⁴ In their paper, they suggested the tradition of working together as one potential explanation for their findings.

The rest of the paper is organised as follows. In section II, we discuss the underlying economic theory and how the survey was designed, followed by presentation of the results in section III, and section IV concludes.

II. Modeling and Measuring Positional Preferences

There are many ways to incorporate relative position or status into the utility function. Most studies have either used some kind of *ratio comparison* utility function, $U = v(x, x/\bar{x})$, where x is the individual's income (or consumption vector of different goods) and \bar{x} is the average income in the society (for example, Boskin and Sheshinski, 1978; Layard, 1980; Persson, 1995), or some kind of *additive comparison* utility function, $U = v(x, x - \bar{x})$ (for example Akerlof, 1997; Knell, 1999; Ljungqvist and Uhlig, 2000).⁵ In this paper we apply the following additive comparison utility function

$$v = (1 - \gamma)x + \gamma(x - \bar{x}),$$

where γ measures the *marginal degree of positionality*, that is the fraction of the total change in utility that comes from increased relative income from the last unit of income.⁶

In order to elicit individuals' preferences for relative position, a scenario has to be created to be read to the respondents during the interview. In order to make it cognitively easier for the respondents, we stated that they could think of an investment project in, for example, pigs or any other animal such as cows or perennial crops. The investment project was stated to be distributed free of charge by an external donor without imposing any cost on the people in the village, but the income from this investment would differ among the residents in their village. In the scenario, we told the respondents that they were about to choose between two different alternatives, that is, investment projects with different outcomes in terms of income for both themselves and the average person in the village. The two alternatives were shown on a card as well as read out loud. On the cards, the outcome for the respondent and the mean outcome for the village in Vietnamese Dong (VND)⁷ were presented, as well as pigs faces, which were scaled according to the monetary amount. We used this approach since some respondents were expected to be illiterate. The scenario read by the enumerators is given in Panel 1.

Panel 1. Survey questions: introductory blurb and sample scenario

In the following questions we ask you to make a number of independent choices, related to different investments in pigs. Note, the investment in pigs is just to symbolise an investment decision. It does not have to be pigs, it could be cows or perennial crops, or any other type of investment. The investment is distributed free of charge by an external donor and thus there is no investment cost to you, your household or the village.

The difference between the alternatives is the yearly income for you and the average yearly income in your village. The income from the investment can affect your well being, which means you might feel you are richer than the others in the village.

We will now ask you to choose between two alternatives. We will ask you several questions, but there is only one investment made. Alternative A is always the same.

Let me illustrate this choice by the following example.

Alt. A.

- Your yearly income from the investment is 2,500,000 VND
- The yearly average village income from the investment is 3,000,000 VND

Alt. B.

- Your yearly income from the investment is 2,300,000 VND
- The yearly average village income from the investment is 2,000,000 VND

In this example you get the 200,000 VND more in Alternative A than in Alternative B. In Alternative A you get 500,000 VND less than the average income in the village, while in Alternative B you get 300,000 VND more than the average income.

Choose the alternative that is best for your household.

How can we measure the concern for status by using a survey? Consider the choice between two investment opportunities presented in Panel 1. The individual's income from the investment in alternative A is 2,500,000 VND and the average income in the village is 3,000,000 VND. In alternative B, the individual's income is 2,300,000 VND, but at the same time the average income in the village is also lower, 2,000,000 VND. If a respondent is indifferent between these two investment opportunities, then we have, in the case of the additive comparison utility function, that:⁸

$$x_A - \gamma \bar{x}_A = x_B - \gamma \bar{x}_B \rightarrow \gamma = \frac{x_A - x_B}{\bar{x}_A - \bar{x}_B} = 0.2.$$

Thus, if a respondent is indifferent between these two investment opportunities, then the marginal degree of positionality, γ , is equal to 0.2. Consequently, if the respondent prefers investment A then $\gamma < 0.2$, and vice versa. By asking repeated questions with different outcomes for both themselves and the average person in the village, it is possible to gain more detailed information about the respondents' degree of positionality.

In our survey, investment alternative A remains the same in all choice sets with a yearly income from the investment of 2,500,000 VND and with an average income in the village of 3,000,000 VND, while these levels were varied in the B alternatives. The B alternatives used in the survey are presented in Table 1, together with the implicit

marginal degree of positionality calculated by assuming indifference between the two alternatives (as in the example above). If an individual chooses alternative A over alternative B₁, then we know that the implicit marginal degree of positionality is below this level, and vice versa. In the survey, the respondents were presented with choice sets until alternative A was picked, starting with a choice between alternative A and B₁. As long as a respondent chose alternative B₁ over alternative A, another choice set was presented, up to a maximum of four choices.

III. Results

The survey was conducted in the Dong Tam commune (Binh Phuoc province) in southern Vietnam during spring 2002. The province is predominantly hilly and most households are engaged in farming activities. Our survey was a part of a larger household survey with interviews in 212 randomly selected households. The sample of households was randomly drawn from the village roster provided by the chair of the commune’s farmer association.

The descriptive results of our survey are presented in Table 2. The majority of the respondents had a low degree of positionality with 64 per cent of the sample having a degree of positionality below 0.25 resulting in a median degree of below 0.25. The mean degree of positionality is calculated to 0.28.⁹ These estimated degrees of marginal positionality are lower than those found in other studies done in other countries. Carlsson et al. (2003) estimate a mean degree of positionality for income in the 0.59 and 0.71 range using a random sample of the Swedish population, while Alpizar et al. (2005) estimate a mean degree of positionality for income of 0.45 using a sample of Costa Rican university students. Using the same assumptions about the utility function as we have done here, the implicit mean degree of positionality in

Table 1. Alternatives in positionality survey

	Own annual outcome	Average annual outcome in village	Implicit marginal degree of positionality
Alternative A	2,500,000	3,000,000	
Alternative B ₁	2,500,000	2,000,000	0
Alternative B ₂	2,250,000	2,000,000	0.25
Alternative B ₃	2,040,000	2,000,000	0.46
Alternative B ₄	1,840,000	2,000,000	0.66

Table 2. Results of relative position survey

Marginal degree of positionality	No.	Frequency	Cumulative frequency
$\gamma < 0$	85	0.40	0.40
$0 < \gamma < 0.25$	53	0.25	0.65
$0.25 < \gamma < 0.46$	19	0.09	0.74
$0.46 < \gamma < 0.66$	21	0.10	0.84
$\gamma \geq 0.66$	34	0.16	1.00

Solnick and Hemenway (1998) is 0.33. As we discussed in the introduction, there are a number of aspects in Vietnamese society which could explain why the concern for relative position should be less than in Western countries, such as: (i) that the Communist Party has emphasised the importance of equality; (ii) the fact that rural households have traditionally been organised in cooperatives; and (iii) that individuals living in rural areas are very concerned with how the local community perceives their actions.

Next, we wish to investigate what influences the degree of positionality. It is instructive to simply look at the distribution of responses for various groups in the sample. We test if the degree of positionality can be explained by three distinct sets of variables: (i) income and wealth, (ii) household characteristics and (iii) memberships in organisations. The household income is calculated by adding income from farming and labour activities,¹⁰ and in the analyses we apply the equivalence scaled household income, which is calculated as the household income per capita.¹¹ Income per capita is categorised into five groups: below 1 million VND, 1–1.9 million VND, 1.9–3 million VND, 3–5 million VND and above 5 million VND, where the first two levels are income per capita levels below the poverty line.¹² Wealth is measured by other wealth items, excluding land, and reported as the per capita value of the aggregated market value of durable goods and livestock, excluding land, owned by the household. The second group of variables relates to socio-economic characteristics. We create three dummy variables for the age of the respondents, which relate to important changes in Vietnam, resulting in the following groups; 0–32, 33–46 and older than 46 years. Those who were 20 years and younger in 1986, that is, when Doi Moi started, have lived their entire adulthood during the Doi Moi. Therefore, we separate those that are younger than 33 years from those above that age in 2002. In a similar manner, those who were 20 years and older in 1975 have experienced the capitalist economy before reunification, that is, those older than 46 years in 2002. The level of education indicates whether the respondent has a primary school degree or a higher education than primary school degree as the reference group. In addition, we include ethnicity, religious belonging, gender and household size as explanatory variables. The third set of variables is related to whether anyone in the household is member of the Peasant Association or the People's Committee. Finally, we included two variables which potentially can be seen as positional: whether the household has a television or motorcycle.

In Table 3, we report on the distribution of the responses among different income, age and education groups; in addition we include the responses for members and non-members of the People's Committee and the Peasant Association. As can be seen, there does not seem to be much difference between different income groups, or different age or education groups. Using a Kruskal–Wallis test, we can not reject the null hypothesis among the various groups. However, members of the People's Committee seem to care more about positionality than others; so we can reject the hypothesis of equal distribution of responses in this case. Let us look into this in more detail by estimating determinants of the marginal degree of positionality using the interval regression technique, which takes into account that the dependent variable is measured in intervals.¹³ The results of the estimations are presented in Table 4 together with descriptive statistics of the explanatory variables.¹⁴

Table 3. Proportion of degree of positionality for various socio-economic categories (%)

Variable	Low degree of positionality $\gamma < 0$				High degree of positionality $\gamma \geq 0.66$			H0: Equal distribution between the socio-economic groups (p-value)
	$0 < \gamma < 0.25$	$0.25 < \gamma < 0.46$	$0.46 < \gamma < 0.66$	High degree of positionality $\gamma \geq 0.66$				
Household income per capita is below 1 million VND	43	32	2	9	15		0.61	
Household income per capita is 1 million VND to 1.9 million VND	33	15	21	6	24			
Household income per capita is 1.9 million VND to 3 million VND	35	29	6	15	15			
Household income per capita is 3 million VND to 5 million VND	46	15	15	5	20			
Household income per capita is above 5 million VND	40	31	4	13	12			
Age 0–32 years	38	23	10	13	15		0.49	
Age 33–46 years	36	29	7	9	20			
Age 47+ year	45	22	10	9	13			
Less than primary education	38	35	8	6	13		0.58	
Primary education	48	15	12	12	12			
Secondary education	39	24	8	11	19			
Not a member of the Peasant Association	35	28	9	10	18		0.21	
Peasant Association member	44	23	9	10	14			
Not a member of the People's Committee	42	26	7	11	14		0.01	
People's Committee member	18	12	29	0	41			

Table 4. Interval regression estimates of the degree of positionality

Description	Coeff	P-value	Mean
Income and wealth indicators			
= 1 If household income per capita is below 1 million VND (1000 dong); otherwise zero	-0.033	0.566	0.226
= 1 If household income per capita is 1 million VND to 1.9 million VND (1000 dong); otherwise zero	0.051	0.439	0.159
= 1 If household income per capita is 1.9 million VND to 3 million VND (1000 dong); otherwise zero	0.022	0.726	0.163
= 1 If household income per capita is 3 million VND to 5 million VND; otherwise zero	-0.015	0.807	0.197
= log of the wealth in million VND	0.024	0.143	7.806
Household characteristics			
= 1 If respondent older than 46; otherwise zero	-0.085	0.165	0.370
= 1 If respondent aged 33–46 years; otherwise zero	-0.036	0.545	0.442
= 1 If primary school degree; otherwise zero	0.010	0.878	0.159
= 1 If higher than primary school education; otherwise zero	0.016	0.751	0.587
= 1 If household belong to the main ethnic group; otherwise zero	0.094	0.062	0.731
= 1 respondent is a Buddhist; otherwise zero	-0.022	0.606	0.317
= 1 If any household member is a member of the People's Committee; otherwise zero	0.190	0.011	0.082
= 1 If any household member is a member of the Peasant Association; otherwise zero	-0.073	0.078	0.548
= 1 If at least one TV set in the household; otherwise zero	-0.109	0.018	0.625
= 1 If at least one motorcycle in the household; otherwise zero	0.018	0.704	0.558
Number of household members	0.039	0.004	4.712
Constant	-0.077	0.611	
Sigma	-1.301	0.000	
Adjusted R ²			
Number of observations		208	0.272

Neither income nor wealth has a significant influence on preferences for relative position in the interval regression. Interestingly, having at least one person in the household who is a member of the People's Committee results in being more status concerned, with a marginal degree of positionality around 0.19 units higher than the others. This is an unexpected result, especially since we would expect that the political system of Vietnam is one explanation why the Vietnamese, in general, are less concerned with relative position. We can only speculate why this is the case, one being that households with active members of the People's Committee are more concerned with relative position, and that they see the membership as a way of receiving either political, or for that matter, material status. Consequently, if one values either political empowerment or material wealth, membership in the People's Committee might be beneficial. Moreover, party members have been in favour of

allowing people to do business in the private sector (Tuyen et al., 2003). Hence, active members of the People's Committee might be in the forefront of a new and politically innovative way of looking at the collective, and in light of this, our finding might be less surprising. The results could also be explained with individuals choice of reference group. For example, Runciman (1966) stresses that the choice of reference group is very important. In our case, it could be that members of the People's Committee have another reference group such as more wealthy people living outside the rural areas. It should also be noted that a similar effect is found in Johansson-Stenman et al. (2002). They find that left-wing voters in Sweden are more concerned with relative position than others. On the other hand, the respondents from a household where at least one household member was a member of the Peasant Association indicated a lower degree of positionality, around 0.07 units, and this was significant at a 10 per cent level. Possession of a television resulted in a significant lower marginal degree of positionality, while the opposite effect for household size, both significant at a 5 per cent level.

IV. Conclusion

In this paper, we have investigated individuals' preferences towards relative position or status in a rural province in Vietnam using a survey where the farmers were asked to make hypothetical choices. Hypothetical surveys are, of course, by no means without problems, see Bertrand and Mullainathan (2001). In our case, we have asked about people's perception of the importance of relative income, but one may doubt farmers are able to express their preferences in this issue. Results from earlier studies, such as Johansson-Stenman et al. (2002) and Alpizar et al. (2005), seem to indicate an overrepresentation of extreme responses, that is, responses with either a very small (or negative) or a very large degree of positionality. The results here are also extreme, in the sense that a large fraction state that they do not care about their relative position. It appears reasonable that at least parts of these extreme responses derives from respondents choosing to apply cognitively easier strategies when responding to the questions. For example, in the first set of questions it is possible that some respondents initially decided that absolute income is more important than relative income, and then answered consistently to this without trying to make trade-offs in each case. Thus, our estimated mean degree of positionality can be underestimated.

The results indicate that respondents are not particularly concerned over their relative position, and that the mean degrees of positionality are lower than those found in comparable studies conducted in Western countries. This might be largely explained by a political system proclaiming equality as well as the close relationships among people. Them (1997) argued that one distinguishing feature of the Vietnamese people is their respect for the community. Community consciousness is often higher than individual consciousness resulting in people being concerned about living in harmony with their community. An interesting and unexpected finding in our econometric analysis is that households consisting of at least one member of the People's Committee care more about relative position than others.

In Vietnam, before Doi Moi in 1986, cognizance of class differentiation led to a campaign for agricultural collectivisation, accompanied by the imposition of an egalitarian distribution principle within these cooperatives. Nam (2001) argued that

this kind of policy made social stratification on the countryside almost non-existent. Since then Vietnam has moved towards a market-oriented economy, but there are clear remnants of the egalitarianism in the rural areas. The strong interaction between individuals found in Vietnam today was perhaps present in Western Europe one or two generations ago. Thus, the development in Vietnam may result in a deterioration of the tight interactions among individuals, which also would result in lower social capital. Thus, it is therefore interesting to follow a country such as Vietnam since it provides a very good opportunity to study how traditional values transform during times of rapid changes. Moreover, this may also provide the possibility to identify factors that can sustain traditional values.

Asking hypothetical questions about such a difficult thing such as relative position, is by no means a simple task. Consequently, one should be careful when applying various kinds of quantification methods and when analysing and interpreting the results. As most things we are genuinely interested in however, are very difficult to measure (such as freedom, welfare and happiness). Hence, avoiding measuring everything that is difficult to measure does not appear to be very sensible. As expressed by Sen (1987, p. 34): ‘Why must we reject being vaguely right in favour of being precisely wrong? The conflict between relevance and simplicity of use [...] is indeed a hard one in economic measurement and evaluation, but it is difficult to see why simplicity of use should have such priority over relevance.’

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Notes

1. Using international USD, which is a dollar having the same purchasing power as one USD in the USA, Vietnam’s gross per capita income is 6.4 per cent of the gross per capita income in the USA (World Bank, 2004).
2. However, there can also be an opposite effect from being concerned with equality, since if one strongly dislikes being in a worse position than others, this would then induce concern for status.
3. Doi Moi meant abandonment of central planning and collective agriculture, and the adoption of market socialism.
4. In a public good experiment, the subjects decide on how much of their endowment to invest in a public good and how much to keep for a private good. The experiment is set up in such a way that each unit invested in the public good returns less than unity to the investing subject. However, all other subjects in the group also benefit from the investment by a single subject by obtaining the same return as the subject who invested. Moreover, if all subjects in the group invest one unit, then the return to each subject exceeds one. Thus, the Pareto optimal solution is for each subject to invest his full endowment in the public good, while the Nash solution is to invest nothing in the public good. Normally, investments in public goods are in the range of 40–60 per cent during the first periods and decline over time. However the experiment in Ho Chi Minh investments were in the range of 60–80 per cent, and did not decline over time.
5. The only empirical test between these two functions that we are aware of is Johansson-Stenman et al. (2002), who found that the ratio-formulation performed better in terms of explaining respondents’ behaviour. However, they concluded that more research is needed on this issue.

6. However, the results presented in section III are similar when we applied a ratio comparison utility function in the analysis.
7. The exchange rate was 15,158 VND = 1 USD at the time of the survey.
8. One advantage of the additive comparison utility function is that the degree of positionality is independent of the initial wealth or total income, that is, we do not need to adjust the estimates from the survey for this. At the same time, this can of course be seen as a critique against the additive comparison function as being unrealistic.
9. For non-extreme responses we use the mid-value in each interval when calculating the mean. For the extreme responses $\gamma < 0$ and $\gamma > 0.66$ we set the values to 0 and 1, respectively.
10. Income from agricultural production is calculated as the net value of the income from selling the agricultural products and the cost of production including the cost of hired and in-kind labour. Although some of the labour is in-kind, it is expected that the receiving household will pay back and this is the reason why a price is set on this factor input.
11. A number of different equivalence scale measures were tested using different fractions on a child's consumption in comparison with an adult's consumption, as well as on the extent of economies of scale in the household following the ranges discussed in White and Masset (2003), who investigated this issue in Vietnam. The correlation between the different equivalence scaled income that we calculated was high. Thus, we used the number of household members as the denominator since it is a straightforward measure to apply.
12. The poverty line, based on the cost of basic needs method, was calculated to be 1,789,871 VND per person and year in 1998 using the Vietnam Living Standards Survey (Glewwe et al., 2002). Adjusting for inflation, the poverty line would have been around 2 million VND (1,968,610 VND) at the time of our survey in 2002.
13. As can be seen in Table 2, we do not directly observe the marginal degree of positionality. What we observe is an interval in which the degree of positionality for a particular individual is. The lower and upper limits are: 0, 0; 0, 0.25; 0.25, 0.46; 0.46, 0.66; 0.66, 1.00.
14. We perform a type of RESET test in order to assess if the models are misspecified and/or if variables are omitted. This was performed by re-running the regressions when also including the squared, cubic and quadratic values of the predicted value of the dependent variable (see for example, Godfrey, 1988). We cannot reject the hypothesis of correct specification and no omission of relevant variables in the model at 5 per cent significance level. We also conducted a joint test of all four income variables are equal to zero, and we can not reject this hypothesis at 5 per cent significance level.

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