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19. July 2013

NEIGHBOURHOOD EFFECTS AND SOCIAL BEHAVIOUR: THE CASE OF IRRIGATED AND RAINFED FARMERS IN BOHOL, THE PHILIPPINES

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Abstract

Artefactual field experiments, spatial econometrics, and household survey are blended in a single study to investigate how the experience of collective irrigation management in the real world facilitates the spillover of social behaviour among neighbours. The dictator and public goods games are conducted among irrigated and non-irrigated rice farmers in the Philippines. The spillover effect is found only among irrigated farmers. In the public goods game, punishment through social disapproval reduces free-riding more effectively among irrigated farmers. These indicate that strengthened ties among neighbours are likely to induce the spillover of social norms together with an effective punishment mechanism.

Key words: behavioural games, artefactual field experiments, spatial econometrics, dictator game, public goods game, irrigation, social norms

JEL Classification: C59, D01, Q25

Acknowledgements: We would like to thank the Japan International Cooperation Agency and Japan International Research Center for Agricultural Science for their financial support in survey data collection, Shigeki Yokoyama as co-manager of the project, Modesto Membreve, Franklyn Fusingan, Cesar Niluag, Baby Descallar and Felipa Danoso of the National Irrigation Administration for arranging interviews with farmers, and Pie Moya, Lolit Garcia, Shiela Valencia, Elmer Suñaz, Edmund Mendez, Evangeline Austria, Ma. Indira Jose, Neale Paguirigan, Arnel Rala and Cornelia Garcia for implementing the experimental games and cleaning and processing the data.

1. Introduction

A growing number of studies have uncovered the existence of many kinds of social behaviour such as altruism, trust, and cooperation and punishment for public purposes, although a standard model of *Homo economicus* does not predict so (Fehr and Gächter, 2000; Ostrom, 2000; Henrich *et al.* 2001; Bowles and Gintis, 2011). Moreover, many empirical and experimental studies have observed variation in patterns of social behaviour across different groups of subjects (Cardenas *et al*. 2008; Henrich *et al*. 2010; Lamba and Mace, 2011; Gächter *et al*. 2012). Understanding differences in the formation process and in the level of social behaviour is important because recent investigations insist that social behaviour considerably affects key economic phenomena, including economic growth, poverty reduction, consumption smoothing, collective action, and the optimal design of contracts, institutions, and markets.

The development of social norms is a key phenomenon that will help in understanding the formation of social behaviour better. The role of norms is found in their capacity of domesticating our *Homo economicus* preference and deriving pro-social behaviour for sustainable and successful interaction among a large number of people, some of whom may be unknown to each other, in a more complicated society where new technologies and the environment change the expected returns to relation-specific investments (North, 1990; Ostrom, 1990; Ostrom *et al*. 1994; Bowels, 1998; Henrich *et al*. 2010). Then, as evolutionary approach emphasises, more effective norms spill over among people in a society by a variety of theoretically and empirically underpinned mechanisms, including gene-culture coevolution (in the very long-run), adoptive cultural reaction varying from the imitation of more successful norms to simple conformism to the current majority and a decision by leaders (Ostrom, 2000; Henrich, 2004; Bowels and Gintis, 2011; Lamba and Mace, 2011). Under such possible processes, the development of norms in society may be observed as the process enhancing the co-variation of social behaviour through a spillover effect.

However, the examination of the spillover effect is missing in existing studies on the determinants of social behaviour, which have focused mainly on macro factors such as market integration, ecology, and culture, as well as on micro factors such as group size and socioeconomic heterogeneity (Baland and Platteau, 1996; Ostrom *et al*. 2000; Henrich *et al*. 2010; Rustagi *et al*. 2010; Gächter *et al*. 2012). Over the past decade, with the development of spatial econometric techniques, statistical examination of the interdependent behaviour of individuals who share spatial, social, and economic milieus has become possible (Anselin and Griffith, 1998; Anselin, 2003; Anselin, 2010).

Taking advantage of the recent development in techniques, our research strategy is to blend artefactual field experiments, spatial econometrics, and household survey in a single study. Two experiments (dictator game and public goods game) are conducted by the authors to quantitatively elicit the general attitude of altruism and cooperation, respectively, from farmers in Bohol, the Philippines. In the context of rural agrarian communities, day-to-day social interactions take place within the communities. Thus, subsequently, the spillover of such social behaviour in the local communities is tested using spatial econometric techniques, while socioeconomic and agroecological factors collected through the household survey are duly controlled for.

Extra attention is paid to the difference in spillover effects between the irrigated and non-irrigated (or rainfed) areas. Among many, collective management of common pool resources is regarded as an opportunity that strengthens ties and generates social norms among local people (Ostrom, 2000; Aoki, 2001; Hayami and Godo, 2005; Fujiie *et al*. 2005; Hayami, 2009). In our study area, a gravity irrigation system, which must be managed collectively by the users in geographical proximity, was newly introduced in the traditional rainfed rice area two years before our survey. This event would strengthen location-based ties, which can be captured as neighbourhood effects in spatial economics. In short, this paper intends to show empirically how the increased importance of collective action among local people in the real world facilitates the spillover of general social behaviour among spatial neighbours.[1]

From the analysis, three main findings emerged. First, altruistic behaviour and cooperative behaviour are significantly influenced by those of the neighbours predominantly in the irrigated areas, implying the inclination to domesticate personal preference and to behave similarly to their neighbours through the experience of collective irrigation management. Note, however, that this finding also implies that the domestication of personal preference may not necessarily mean that it is pro-social, because the neighbourhood effect can also result in reduction of the high contributors' contribution to the neighbours' level, pointing to the possibility of a vicious consequence of a conformism-type of norm dissemination. Second, the neighbourhood effect for cooperative behaviour is observed more strongly among farm plot neighbours than among residential neighbours, possibly reflecting their interactions for irrigation

[1] We may place our investigation in the group of literature that deals with the development of social behaviour with possible mutuality, rather than in the literature on the evolutionary process of cooperation under completely unknown and non-repeated setting on which Bowles and Gintis (2011) focus. In this regard, our paper is in line with Binzel *et al*. (2003), Etang *et al*. (2011), and Goette *et al*. (2012) that investigate the effect of social ties in the real world on social behaviour in the experiments.

management in the real world. Third, a dissatisfaction message (a kind of costly punishment from group members) increases the contribution in the subsequent round of the public goods game in both ecosystems. Note, however, that the effect on free-riders is greater in the irrigated areas, indicating the emergence of a stronger community mechanism of punishment that compensates for the function of norms. These findings generally support the theory of norm evolution through common pool resource management.

Following this introduction, Section 2 provides the background of the study site and survey. Section 3 outlines the idea of neighbourhood effects in more depth and assembles our main hypotheses. Section 4 introduces the econometric methodology to estimate neighbourhood spillover effects. Section 5 explains our survey data by illustrating the experimental games used to elicit quantitative measures of farmers' social behaviour, as well as describing the characteristics of possible determinants and control variables to be included in regressions. Section 6 compares neighbourhood structure between the irrigated and rainfed areas. Section 7 presents the results of the regression analysis, followed by a robustness check in Section 8. Finally, Section 9 offers concluding remarks.

2. Background of the Study Site and Survey

Our study site is located in the northeastern part of Bohol, an island in the Central Visayas region belonging to *Cebuano*-speaking culture in the Philippines. As in other parts of the Philippines, traditional social relationships in the study area may be characterised as loosely structured, the concept first introduced by the classic work of

John Embree (1950) on Thailand contrasted with Japan (Hayami and Kikuchi, 1981, 2000).[2] Characteristics of this structure include the absence of a clear boundary of the community network, individualistic behaviour, and weak cohesion and solidarity (Embree 1950). The nature of this loose structure may be stronger in our study site because the places of residence are relatively scattered over a wide geographical area, rather than having a core residential area in the center of the community.

Characterization of our study site as loosely structured, however, does not mean that social interactions are thin altogether. Among several terms alleged to characterise the value system in the Philippines, two terms are often cited as important values; *makikiusa*, which means smooth interpersonal relationship by being united with the group, in particular by following the group decision, and *utang na kabubut-on*, which means a sense of indebtedness in receiving good treatments.[3] These terms indicate the existence and importance of such relationships traditionally, although the structure is relatively loose.

The structural difference between a loose society and a tight one may stem from the ecological difference between non-irrigated Thai villages and irrigated Japanese villages at the time Embree compared the two societies. Based on his observations in Japan, he emphasised that the "joint working of community not only gets work done, but keeps the people together by uniting them in a common task and afterward in a common drinking party (Embree, 1939)." This assertion is consistent with the summary by Ostrom

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[2] Of course, the degree of looseness differs among regions in the Philippines, including Ilocos which is known as a tight society. However, in general, many comparative studies of rural villages have discovered less tight structure in Southeast Asia, including the Philippines (Hayami and Kikuchi, 1981, 2000).

[3] In Tagalog, which is the base of the official language of the country, the former becomes *pakikisama* and the latter becomes *utang na loob*.

(2000) which argues the evolution of tight social norms as a reaction to the necessity for collective management of common pool resources. We postulate that traditional relationship in the study area may be strengthened toward a tighter direction through irrigation management, as Embree and Ostrom observed.

The Bayongan irrigation system, located in the study area, began operation in 2008. It is a typical gravity irrigation system consisting of a reservoir dam, canals, water intakes, and farm ditches. In principle, water from an intake is shared by a group of farmers. They form a water-users group (WUG), which collectively takes care of the construction and maintenance of farm ditches, control of water intake, water allocation among the members, and coordination with other WUGs. The system consists of 150 WUGs with membership that ranges from 4 to 70 farmers and averages 20.

Under the current regulation, each irrigated farmer has to pay an irrigation service fee equivalent to 150 kg of paddy per hectare per season (an area-based pricing system) to the National Irrigation Administration.[4] For the sake of other research projects, half of WUGs randomly selected receive as reward a monetary equivalent of water savings based on consumed volume, while the other half by the current pricing method (i.e., zero marginal cost). Hence, the demand for collective water management for water savings is higher in the former set of WUGs than in the latter. This feature is utilised for testing our hypotheses.

The International Rice Research Institute (IRRI) conducted a set of surveys on 243 randomly selected rice farmers over four agricultural seasons from 2009 to 2010. The collection served as the individual-level primary dataset for our study. The survey

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[4] This amount is equivalent to 2,500–3,000 Philippine Pesos (the market price of paddy being 14–20 Philippine Pesos per kg), or about 5% of gross revenue under the normal yield of 3 t/ha.

covers both irrigated areas and rainfed areas, where the sample sizes are 132 and 111, respectively. In order to make the comparison between the two agroecosystems meaningful, the rainfed sample was taken from the area adjacent to the irrigated area that was determined by the National Irrigation Administration as an irrigable area in the next phase of the Bayongan irrigation project. The soil type (sandy loam) is also the same in the two areas. Thus, the rainfed sample shares a similar background to the irrigated sample in that both are in the same cultural zone, with similar hydrological and soil conditions. This is further examined statistically in Sections 5 and 6.

The data set consists of household characteristics, the results of artefactual field experiments, and geographical coordinates. The geographical coordinates are recorded for both the farm plots and residences of the sample farmers, which allows us to define two types of neighbourhood (plot and residential) for each individual farmer.[5] Figures 1 and 2 present the locations of their residences and farm plots, respectively.

3. Neighbourhood Effects and Hypotheses

Ioannides and Topa (2010) delineate three sources of neighbourhood effects.[6] First, the direct effects of neighbours' outcome on the individual's outcome are known as *endogenous social effects*. The propensity of an individual to behave in some way varies together with the prevalence of that behaviour in some reference group containing that individual. For instance, individuals care about their neighbours' altruism, which then

[5] For farmers with multiple plots, the geo-coordinates of the most important plot self-claimed by the respondents are considered.

[6] Depending on the context, neighbourhood effects can be called, "peer influences", "conformity", "imitation", "contagion", "epidemics", "bandwagons", "spatial externalities", "herd behaviour", "neighbourhood spillover", or "interdependent preferences" (Manski, 1993).

affects their own altruism.[7] That is, own decisions and the decisions of those in the same neighbourhood are, in some sense, mutually influential.[8] Second, individuals also care about the personal characteristics of others, i.e., whether their neighbours are young or old, male or female, rich or poor, black or white, trendy or traditional, and so on. Such effects are known as *exogenous social effects*.[9] Third, individuals in the same social settings may act similarly because they share common unobservable factors or face similar institutional environments. Such an interaction pattern is known as *correlated social effects*. A precursor to the concept is Manski (1993), who emphasised the difficulty in separately identifying endogenous effect from exogenous effect in linear models, as well as in identifying the two effects from correlated effect. Drawing on this argument, we attempt to explicitly distinguish the three sources of social effects in our econometric model (Section 4) while referring to all the three as "neighbourhood effects."

One general note on the identification of neighbourhood effects is that it may suffer a self-selection problem (Manski, 1993; Goetti *et al*. 2012). Interdependence among individuals' decisions and behaviour within a spatial or social milieu can be complicated by the fact that, in some circumstances, individuals can choose their own

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[7] *Endogenous social effects* appear as long as one cares about the expected outcome of the others' decision, even without observing others' actual behaviour. One example is when a common rate of monetary contribution to ceremonies (weddings and funerals, for example) is implicitly set among the people. The co-variation of social behaviour in our case is another example.

[8] Examples are nicely presented by Bandiera and Rasul (2006), who conducted a household survey on sunflower adoption in Mozambique, Case (1992), who did research on new technology adoption among rice farmers in Indonesia, and Conley and Udry (2003), who analyzed social learning of new technology in pineapple farming in Ghana.

[9] In sociology literature, *exogenous social effects* are often referred to as "contextual effects."

neighbourhood. In other words, individuals may choose their neighbourhood effects by choosing their residence or workplace or both. Such choices involve information that is unobservable to the researcher, and thus require inference about possible factors that contribute to their choices (Brock and Durlauf, 2001; Moffitt, 2001; Bandiera and Rasul, 2006; Blume *et al*. 2010). In our analysis, however, the self-selection problem is negligible since we have confirmed in our interview that the farmers have not relocated or chosen their community since the introduction of the irrigation system. Sampson *et al*. (1999) also back up this point by indicating that the most reliable conditions in favour of neighbourhood effects are residential stability and low population density, among other things.[10]

The discussion above drives us to our main empirical questions on whether, in what cases, and in what ways farmers' social behaviour is influenced by their neighbours' behaviour and characteristics. The background of the study site indicates that some social interactions take place even in the rainfed area. Therefore, our first hypothesis to be tested is that social behaviour of individual farmers is influenced by their neighbours' social behaviour and personal attributes.

Second, social interdependencies become stronger if individuals share a common pool resource and social space that may generate constraints on individual actions (Ostrom, 2000; Aoki, 2001; Hayami and Godo, 2005; Ioannides and Topa, 2010). Because the introduction of irrigation systems increases the demand for collective management of communal water resources among the spatial neighbours (Ostrom, 2000; Aoki, 2001; Fujiie *et al*. 2005; Hayami, 2009), our second hypothesis is that

[10] To be more specific, they found that the most reliable conditions are low population density, residential stability, and concentrated affluence rather than concentrated poverty, racial/ethnic composition, and individual-level covariates.

neighbourhood effects on social behaviour, particularly on contribution to public goods , are greater in the irrigated area vis à vis in the rainfed area.

Third, by the same token, volumetric pricing should be an incentive, more than area-based pricing in which the marginal cost of using water is zero, for better collective action toward irrigation water savings. Hence, our third hypothesis is that, in irrigated areas, farmers are more contributory to public goods when they are engaged in a volumetric incentive system than in an area-based flat rate system.

Fourth, the second and third hypotheses imply that neighbourhood effects on public goods contribution may be greater when we consider farm field neighbours than residential neighbours, as collective actions must be required more intensively in field work than in residential life. Sampson *et al*. (2002) also emphasise the need for looking into social interactions at school or workplace, despite common practice in neighbourhood-effects research of looking solely at the place of residence. Accordingly, our fourth hypothesis is that the endogenous social effects on public goods contribution are more salient among farm plot neighbours than among residential neighbours.

4. Spatial Econometric Model

Our estimation procedure starts with a general a-spatial model where a farmer's social behaviour depends only on his/her own socioeconomic characteristics:

$$\boldsymbol{Y} = \boldsymbol{X}\boldsymbol{\alpha}_1 + \boldsymbol{\varepsilon}_1 \qquad (1)$$

where $\boldsymbol{Y}$ represents an $N \times 1$ series measurement of social behaviour (altruistic or contributory behaviour) of individual farmers; $\boldsymbol{X}$ represents an $N \times K$ matrix containing vectors of K variables that measure the individual agricultural and socioeconomic characteristics; and $\boldsymbol{\varepsilon_1}$ represents the residual or error term.

To include a neighbourhood structure in the model, an $N \times N$ weight matrix $\boldsymbol{W}$ is constructed from the geographical coordinates of N sampled farmers. In this paper, the weight matrix is based on the arc distance between observations. First, we create a binary matrix with elements coded 1 when two observations (spatial units) are neighbours, and 0 otherwise. Hence, by definition, the diagonal elements of the matrix, which describe the self-relationship, are all zeros. In this paper, we start with the matrix constructed by imposing the shortest possible threshold distance, which ensures that all observations (spatial units) have at least one neighbour. Different kinds of weight matrix are examined for a robustness check. The binary matrix is row-standardised to ensure that the row sum is equal to unity. In order to test the fourth hypothesis, two forms of neighbourhood structures are considered: residential neighbourhood $\boldsymbol{W_r}$ and farm plot neighbourhood $\boldsymbol{W_p}$, so that we can investigate which type of neighbours is more influential on farmers' social behaviour.

The exogenous social effects as discussed in Section 3 are systematically modeled by Autant-Bernard and LeSage (2011) into a spatial econometrics framework. Algebraically, Eq. (1) can be modified to include the influence of neighbours' characteristics as:

$$\boldsymbol{Y} = \boldsymbol{X\alpha_2} + \boldsymbol{W_s X\beta_2} + \boldsymbol{\varepsilon_2} \tag{2}$$

where $\boldsymbol{W_s}$ ($s = r, p$) is an $N \times N$ weight matrix, and $\boldsymbol{W_s X}$ is an $N \times K$ matrix containing vectors of the neighbours' weighted averages of the K variables. This specification is also referred to as cross-regressive model.

Spatial diagnostic tests are then performed on the residual $\boldsymbol{\varepsilon_2}$ to determine the appropriate spatial process (see Anselin *et al*. 1996). Performing a set of Lagrange multiplier tests and following the procedure outlined in Anselin *et al*. (1996), the candidate specification can be (a) spatial lag model[11] (with spatially lagged independent variables), (b) spatial error model (with spatially lagged independent variables), (c) the combination of the two (ARAR model with spatially lagged independent variables), and (d) cross-regressive model (i.e., Eq. (2)). The specifications (a)-(c) are expressed as follows:

(a) $\boldsymbol{Y} = \rho_3 \boldsymbol{W_s Y} + \boldsymbol{X\alpha_3} + \boldsymbol{W_s X \beta_3} + \boldsymbol{\varepsilon_3}$ (3)

(b) $\boldsymbol{Y} = \boldsymbol{X\alpha_4} + \boldsymbol{W_s X \beta_4} + \boldsymbol{\varepsilon_4}, \quad \boldsymbol{\varepsilon_4} = \lambda_4 \boldsymbol{W_s \varepsilon_4} + \boldsymbol{\mu_4}$ (4)

(c) $\boldsymbol{Y} = \rho_5 \boldsymbol{W_s Y} + \boldsymbol{X\alpha_5} + \boldsymbol{W_s X \beta_5} + \boldsymbol{\varepsilon_5}, \ \boldsymbol{\varepsilon_5} = \lambda_5 \boldsymbol{W_s \varepsilon_5} + \boldsymbol{\mu_5}$ (5)

where the coefficients ρ, $\boldsymbol{\beta}$, and λcapture the endogenous social effects, exogenous social effects, and correlated social effects, respectively, along the lines of the discussion in Section 3. The coefficient ρindicates the degree of co-variation of social behaviour among the neighbours. Therefore, we may name it the *Makikiusa* parameter that could capture the strength of the traditional social norm of being united with the others. These three models are estimated by Maximum Likelihood Estimation (MLE) procedures, using commands defined in an R package.[12]

The estimated coefficients for the models in Eqs. (3) and (5) cannot be interpreted directly as marginal effects. More transformations are needed to come up with marginal effects associated with a change in any continuous variable used in these models. The total marginal effect can also be decomposed into direct and indirect

[11] It is also often referred to as spatial autoregressive model.
[12] R is free computational software. For more details visit http://cran.r-project.org/

effects. Given that the main goal of the paper is to compare the estimated coefficients between irrigated and rainfed rice farmers, the marginal effects are not shown.[13]

5. Survey Data

5.1 Agricultural and Socioeconomic Variables

Agricultural and socioeconomic variables constitute the vector of variables X described in Section 4., This paper employs, among the collected variables, farmer's age (year), gender (dummy, =1 if male), years of schooling (year), field size (ha), asset (Philippine Pesos, P hereafter)[14], household size (person)[15], and female ratio of the household (proportion) as well as pricing system for irrigation water (dummy, =1 if volumetric reward), to see whether any of these variables of themselves or/and of their neighbours can explain the social behaviour.[16] The average is calculated over four crop seasons for field size, asset, household size, and female ratio.[17] Logarithm is considered for the asset variable to exhibit a distribution that is much closer to normal distribution. The sample mean and standard error of these variables are summarised by irrigation status in Table 1.

To validate the comparison of neighbourhood effects between the irrigated and rainfed samples, albeit we have sampled rainfed farmers from the area with similar

[13] Marginal effects are available from authors upon request.

[14] Asset is included as an indicator of farmers' general wealth level. It consists of agricultural, non-agricultural, and livestock assets.

[15] Household size is defined as the number of household members.

[16] To circumvent a multicollinearity problem, the coefficient of correlation was checked for all the combinations of variables included together in any regression, and was confirmed to be at most 0.35 in the absolute term.

[17] In most parts of the Philippines, rice is cultivated twice a year, i.e., in the rainy season and the dry season.

background to the irrigated area, it is required that the difference in social behaviour arises from the difference in the way farmers interact due to their ecosystem, but not as much from the difference in intrinsic demographical factors. The rightmost column in Table 1 presents the *t*-test diagnostics for the mean difference in the mentioned variables between the two ecosystems. The only highly significant difference is found for field size. From our field observation, we noted that the rainfed farmers tended to overestimate the size of their land, while the irrigated farmers knew the exact size of their fields as these were measured by the irrigation authority when the irrigation system was introduced.[18] Nevertheless, attention is paid to this variable when discussing the regression results. For all other variables, however, the mean difference is neither statistically significant nor large in magnitude. We therefore assume that there is little intrinsic difference between the irrigated and rainfed samples, except the ecosystem itself.

5.2 Experimental Games Design

Our dependent variables are the indicators of social behaviour, which are the results of our artefactual field experiments. To elicit farmers' social behaviour, IRRI conducted two types of experimental games at the end of the last survey season, following a standard protocol: (1) the dictator game for measuring altruistic behaviour, and (2) repeated public goods game for measuring contributory behaviour to public work.[19]

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[18] For some rainfed farmers, we compared farmer's self-estimation and GPS measurement, and found their tendency to overestimate.

[19] We follow the experimental protocol of Carpenter *et al*. (2004), Schechter (2007), Carpenter and Seki (2011), and Aoyagi *et al*. (2013). Our instructions appear in Appendix A. In the experiment session, we conducted two additional games: the

Dictator Game

This game is played by an arbitrary pair of individuals: a dictator and a receiver. The dictator is not informed of who his/her partner is, and vice-versa. The dictator is given P 100, which is equivalent to two-thirds of the daily wage rate for a typical farmer in the study area, while the receiver is given no money in the beginning. Then, the dictator is asked to choose the amount $x \in \{0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100\}$ to transfer to the receiver if the receiver is someone in the same village.[20] We specify the type of receiver as a person from the same village, rather than anybody in a society, in order to let the participants feel spatial proximity with the receiver. The dominant strategy under the assumption of *Homo economicus* is no transfer. Hence, the reported amount is regarded as an indicator of each dictator's altruistic behaviour within the village community. The game ends after a one-shot interaction.

Two-rounds of the Public Goods Game, with Monitoring and Message

In the repeated public goods game experiment, participants are formed into groups of four persons within the same village, but are not informed of who their group members are. Then, each consisting member is given P 100 and is asked to choose an amount $x \in \{0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100\}$ to contribute to the group that he/she belongs to. The total amount contributed by all the members is doubled and then shared evenly among the members, regardless of whether each member contributes more or less than the others. Thus, the payoff function of this game is

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ultimatum game and the trust game. The final payoff of the experiment was revealed at the end of the entire session.

[20] In our experimental games, village is expressed by the local term *barangay*, which is the smallest official administrative unit corresponding to the concept of village in general.

$$\Pi_i(x_i, x_j) = (100 - x_i) + \frac{1}{4} \times 2 \times \left(\sum_{j \neq i} x_j + x_i\right).$$

The dominant strategy is no contribution, providing an incentive for free riding.

After the first round of the game, participants can, in secret, observethe contribution from each member by paying P 1. Then, one can send an anonymous 'unhappy' signal to a particular member(s) to manifest his/her displeasure, with the cost of P 1 per message sent.[21] This introduces costly punishment to the game. The second round of the game is played immediately after the first round, within the same groups. The amount of contribution provides a measure of the player's contributory behaviour to public work, or anti-free-riding behaviour.

5.3 Control Variables in the Public Goods Game Analysis

Risk Preference

One critical control variable in the estimation of the public goods game results may be the farmers' individual risk-taking behaviour. Some theoretical researches on experimental games and social capital suggest that the propensity to transfer money in games like public goods game, in which the subject receives some amount back from the partner(s), should be closely associated with the willingness to take risks (Cook and Cooper, 2003; Ben-Ner and Putterman, 2001). These reports indicate that individuals' propensity to bet in return-expected games is at least partly accounted for by their bet in a risk game. Hence, we also conducted a risk game experiment based on Schechter (2007). The game is played by one person only. The player receives P 100 and is given

[21] We used a so-called 'unhappy' face icon card to express the message of dissatisfaction. The cards are secretly given to the designated persons at the beginning of the second round of the game (Carpenter and Seki, 2011).

an opportunity to bet a share. The bet is multiplied by either 0, 0.5, 1, 1.5, 2, or 2.5, determined by the player drawing one of six cards bearing these numbers, with equal probabilities of being selected. The betted amount is recorded as an indicator of the individuals' risk preference.

Message Receipt Dummy

The message receipt dummy (MRD) takes the value of 1 if the individual received at least one message of complaint from the group members after the first round of the public goods game, and 0 otherwise. The MRD variable is included in the regressions for the second round, and a positive coefficient is expected, on the grounds that the presence of peer pressure discourages free-riding behaviour.[22]

Free-Riding Index

The free-riding index (FRI) is defined as a product of two variables: (a) the average of the group members' contribution minus one's own contribution, which indicates the relative degree of free-riding within the group, and (b) the dummy of whether one checked the other group members' contributions explicitly. The FRI is therefore intended to express recognition of one's own free-riding level relative to the group members'.[23]

[22] We also performed regressions using the number of complaints received instead of the MRD. In that case, the coefficients were smaller and less significant.

[23] We also tried including the variable (a) alone, instead of FRI, since one's degree of free riding can be indirectly recognised through the return on the contribution. The regression results were not as clear as with the FRI.

The Interaction Term between MRD and FRI

It is assumed that the effect of receiving messages augments when one is free riding and is aware of it. To control for this impact, the interaction term between the MRD and FRI is created and included in the regressions.

Contribution in the First Round

The most essential control in the second round is one's own contribution in the first round. Onesa and Putterman (2007) point out that those individuals who contribute highly in the first round tend to contribute similarly in the second round. They conclude that public goods contribution is a somewhat persistent behaviour even in the presence of sanction. Thus, without controlling for this tendency, variables such as MRD would suffer a severe estimation bias.[24]

The descriptive statistics of the variables from the experimental games are summarised in Table 2, with a view of comparing the two samples. There is no significant mean difference in these variables, except that the dictator game result is slightly higher in the irrigated areas than in the rainfed areas. Tables 1 and 2 together suggest that farmers in the two ecosystems are not discernibly different. However, the mechanism of determination, particularly regarding neighbourhood effects, could be different.

6. Neighbourhood Structure

[24] We checked and confirmed that the absence of this control variable inverts the sign of the coefficient on the MRD, due to a selection bias.

Four different weight matrices are constructed, corresponding to the four types of neighbourhoods considered: (a) plot neighbourhood for irrigated farmers, (b) plot neighbourhood for rainfed farmers, (c) residential neighbourhood for irrigated farmers, and (d) residential neighbourhood for rainfed farmers.

A threshold distance criterion is used to construct the neighbourhood structure. For a given farmer, all other farmers located within the radius of the threshold distance are considered his/her neighbours. The threshold distance is determined such that all individuals have at least one neighbour. Different kinds of weight matrices are later examined for a robustness check.

We created the weight matrices by using the threshold distance in each of the four neighbourhoods. The threshold distance (in kilometers) for each matrix turned out to be 0.959, 1.302, 0.956, and 1.376 for neighbourhood (a), (b), (c), and (d), respectively. Since our purpose is to undertake a fair comparison among the neighbourhoods, we impose a uniform threshold distance for all matrices, for which we choose the shortest of the four. Hence, the uniform threshold distance of 0.956 km is applied. As a result, a few observations were dropped from neighbourhoods (a), (b), and (d).[25]

Table 3 summarises the characteristics of the four weight matrices. The imposition of the uniform threshold distance seems to be reflected in the insignificant mean difference in average neighbour distance between the two ecosystems. The average number of neighbours per individual and the average distance between neighbours are in a trade-off relationship. The *t*-test suggests more neighbours in the

[25] Two observations were dropped from neighbourhood (b) and one from (d) because they had no neighbours. Therefore, the sample size in the rainfed area became 111.

rainfed areas than in the irrigated areas. We control for this in the robustness check with a different kind of weight matrix.

7. Spatial Regression Results

7.1 *Spatial Model Selection*

To identify the appropriate spatial process for consideration in the regression analysis, Lagrange multiplier tests were performed on the residuals of the cross-regressive estimations for each of the twelve cases (three games multiplied by four spatial weights). The test statistics and our corresponding model choice are summarised in Table 4. The appropriate spatial model is chosen following the procedure outlined in Anselin *et al*. (1996). In a few cases, an alternative model was also estimated for the purpose of checking the robustness of estimated parameters.

7.2 *Estimation Results*

Tables 5, 6, and 7 present the estimation results for the dictator game, public goods game round 1, and public goods game round 2, respectively.

Dictator Game

In the irrigated areas, the *Makikiusa* parameter ρ is found to be positive and significant, according to the results for neighbourhoods (a) and (c) (with the first model). This finding indicates that farmers' altruistic behaviour positively co-varies with the neighbours' altruistic behaviour, resulting in homogeneous social behaviour among neighbours. Importantly, it is not a covariate shock but the altruistic behaviour itself that causes this mutual dependence, as indicated by the specification diagnosis. It is thus inferred that the introduction and availability of irrigation that requires collective management promoted social interactions and behavioural spillovers, which led to the emergence of a kind of social norm. In comparing the magnitude of ρ between (a) and (c), we may claim that the endogenous social effect is larger and more significant among residential neighbours than among plot neighbours. It may be the case that altruistic actions are associated more with daily life activities around their residences than with farming activities on the fields.

As for the exogenous social effects, the only highly significant effect is found in field size among plot neighbours. It is shown that farmers who interact with large landholders are more altruistic, regardless of their own landholding. In comparing (a) and (c), the field size effect is weaker among residential neighbours than among plot neighbours, probably because land size is less visible to residential neighbours.

Among the own characteristics, the effect of household female ratio is positive and significant. Dufwenberg and Muren (2006) report a similar finding that people from certain groups are more generous and equalitarian when women are a majority in the group, which may suggest that members of a female-dominant family tend to be more altruistic.

In rainfed areas, on the other hand, no endogenous social effect or co-variation of altruistic behaviour is detected. Farmers' own land size, however, might have a positive effect on their altruism. In the absence of intensive collective actions, individual farmers' altruistic behaviour is, at least partially, determined by the abundance of his/her land resource. At any rate, rainfed farmers' altruistic behaviour seems to be rather individually than mutually influenced.

Public Goods Game, First Round

In the first round of the public goods game, co-variation of contributory behaviour is not found in any of the four types of neighbourhoods. This result may indicate that before individuals are exposed to the result of monitoring actions exercised by community members, they do not align their contributory behaviour with that of their neighbours. The influence from neighbours' characteristics (i.e., exogenous social effect) is generally weak as well. By no means, farmers' contributory behaviour is clearly influenced by community members, provided no peer effect is in operation in the first round.

Turning to the own characteristics, the most decisive factor is found to be age, of which the coefficients are negative and highly significant.[26] Since public goods contribution has an aspect of investment, the decision must be associated with individual time preference. According to Read and Read (2004), older people discount time more than younger ones, which explains our estimated coefficients.[27] Comparing the two ecosystems, a positive effect of field size is found in the irrigated areas, whereas the coefficient is negative and insignificant in the rainfed areas. Although this result seems somewhat puzzling, a possible interpretation is that large holders of irrigated land depend on collective actions for irrigation maintenance, while in rainfed areas, large holders are relatively self-sufficient. In other words, for large holders, the incentive for community investment is relatively high in the irrigated areas. Volumetric water pricing

[26] Quadratic function of age was also examined. However, the coefficients on the quadratic terms were always insignificant. We have thus removed that term.
[27] Some studies present contrasting findings. Chao *et al.* (2009) find an insignificant age effect on time preference while Aldy and Viscusi (2007) report an inverted U relation. Nevertheless, the downward sloping part of the inverted U may correspond to our result, since a majority of our sample famers are middle-aged or elderly.

has no effect. As expected, risk preference is positively linked with public goods contribution, particularly in irrigated areas, which may be caused by the investment mindset being more established in irrigated areas.

Public Goods Game, Second Round

In the second round of the public goods game, farmers' contributory behaviour, with the influence of monitoring and messaging, is expected to manifest. In the irrigated areas, the *Makikiusa* parameter, ρ, is found to be positive and highly significant, in particular for plot neighbours. Comparing the magnitude of ρ between (a) and (c), this endogenous social effect is greater and more significant among plot neighbours than among residential neighbours, which must be attributed to collective irrigation management conducted primarily in cooperation with plot neighbours, but not as much with residential neighbours. As in the first round of the game, the exogenous social effects are generally weak. Among the own characteristics, the effect of age becomes much less significant compared with the first round. Under pressure of monitoring, the volumetric pricing dummy has positive coefficients, although the statistical significance is not considerably high.

In the rainfed areas, on the other hand, no endogenous social effect is detected. Anyhow, rainfed farmers' contributory behaviour seems to be largely independent of others.

The estimation as to the monitoring-related control variables deserves close attention. The coefficients on MRD are positive and significant all over, indicating that farmers increase their contribution when they explicitly receive an 'unhappy' message from the group members.[28] The result is consistent with the studies that show the effectiveness of costly punishment (Feher and Gächter, 2000; Ostrom, 2000; Bowles and Gintis, 2002). FRI shows a positive impact only in the irrigated areas. Since this index represents farmers' awareness of their own free-riding behaviour, it indicates that irrigated farmers are willing to adjust their contribution voluntarily when they notice their own over-contribution or under-contribution. This result provides another evidence of irrigated farmers' tendency to emulate others, or the emergence of social norms. The MRD-FRI interaction term exhibits a positive impact in the irrigated areas, which means that receipt of complaints is even more effective when combined with the awareness of one's own free-riding behaviour. In other words, in the irrigated areas, free-riders are more responsive to messages of dissatisfaction whilein the rainfed areas, farmers respond to complaints more or less uniformly regardless of free riding. This result may indicate the emergence of a stronger community mechanism in the irrigated areas, which compensates for the social norm for the prevention of free riding. Lastly, contribution in the first round of the game plays a crucial role as a control variable.

7.3 Summary of Findings

In view of our hypotheses, the findings are summarised as follows. First, neighbourhood effects on farmers' social behaviour are identified in this study. The endogenous social effects among irrigated farmers are found in the estimations of the dictator game and of the second round of the public goods game. The exogenous social

[28] The coefficients appear to be smaller in the irrigated areas. However, the total effect of MRD must incorporate the cross effect of the MRD-FRI interaction as well. Since the interaction term is significant only in the irrigated areas, the total effect of MRD is not considerably different between the two ecosystems.

effects are minor on the whole, whereas no correlated social effects are found. Hypothesis 1 is accepted to the extent that it depends on the irrigation availability and the type of social behaviour. Second, there is a clear contrast between the results from the two ecosystems. The endogenous social effects and the impact of FRI are found only in the irrigated areas, which definitely supports Hypothesis 2. Third, volumetric water pricing makes no difference in the outcome of the dictator game and pre-monitoring public goods game, though it has a minimal positive effect in the second round of the public goods game. Thus, Hypothesis 3 is only weakly supported. Fourth, in comparing between plot and residential neighbourhoods, the spillover of public goods contribution under monitoring is stronger among plot neighbours. Hence, Hypothesis 4 is clearly accepted.

8. Robustness to Alternative Weight Matrix

There are different methods of defining the weight matrix. This section briefly examines how robust and valid our results are by estimating the model using three other definitions of neighbours. A popular method, aside from the use of a threshold distance, is to impose a k-nearest-neighbour criterion in which a specified number of nearest neighbours (k) to each individual are defined as neighbours, so that everyone has the same number of designated neighbours. Here we set k to be 6 in view of the average number of neighbours in our main model, which is about 6 and 11 in irrigated and rainfed areas, respectively (Table 3). We denote this matrix as [W1]. An argument may be made that endogenous social effects are not found in rainfed areas due to the inclusion of many (i.e., far) neighbours that causes a possible noise in identifying true neighbour effects. Hence, it is interesting to examine the six-nearest-neighbour structure applied to both ecosystems.

Both the threshold distance method and the k-nearest-neighbour method employ binary weight models, i.e., observations are defined as either neighbours or non-neighbours, nothing in between. A method that contrasts with these is the use of a model in which the neighbourhood influence gradually decreases with distance. We consider a distance decay function defined as inverse distance, and this matrix is denoted as [W2].[29]

Lastly, we examine a model in which all the residents in the same village are considered as neighbours, and those outside the village as non-neighbours. This is denoted as [W3]. Defining neighbourhoods by administrative unit is a method that has been employed in conventional neighbourhood effect studies, although not in the form of applying spatial econometrics techniques. Note that plot neighbourhood is not defined in this approach because village membership is based on residency.

The estimation results using the three weight matrices are presented in Table 8 for the dictator game and round 1 of the public goods game and Table 9 for round 2 of the public goods game). For succinctness, only the variables of major interest are shown.[30] As to W1, positive endogenous social effects are found in the irrigated areas, although to a lesser extent compared with the main model. In the dictator game, the effects are smaller and statistically less significant. In round 2 of the public goods game, the effect is as large and significant in the plot neighbourhood as in the main model, while a correlated social

[29] Needless to say, there are a number of differing methods to define non-threshold type models, e.g., exponential decay.

[30] See Appendix B for the neighbourhood characteristics and the full regression results.

effect is detected for the residential neighbourhood, indicating a spatial correlation not necessarily caused by a direct spillover from neighbours.

On the whole, however, the results from the 6–nearest-neighbours model support the robustness of our main results. As to W2, the statistical significance of the endogenous social effects is notably lower, though the magnitude seems larger. This observation suggests that distant residents do not contribute as largely to behavioural spillover as nearby neighbours, since the model takes into account influences from quite distant neighbours to a certain extent. Still, the results from the distance decay weight matrix are also somewhat supportive of the robustness of our main results. As to W3, neither spatial lag model nor ARAR model is suggested by the spatial diagnostic tests in any game. In other words, no endogenous social effect is found in this neighbourhood model. An important clue is the average number of village members is 24, and thus village members who reside not so nearby are modeled in equally with those really nearby, presumably causing a noise in identifying the behavioural spillover.

These robustness checks seem to reveal two points: first, our main results are robust to the specification of alternative weight matrices. In particular, from the results with W1, it turns out that the difference in the average number of neighbours between the two ecosystems in our main model is not the cause of the presence and absence of a behavioural spillover in the irrigated and rainfed areas, respectively. This clearly supports our view of behavioural spillover being induced by collective irrigation management. Second, the threshold distance model has superiority over the three variants in terms of modeling the spatial spillover of social behaviour. In the context of irrigation management, distance, rather than village membership or uniformity in the number of neighbours, may play a key role in promoting social interaction.

9. Concluding Remarks

The study has provided insights into the emergence of social norms for pro-social behaviour and community mechanisms induced through the experience of community-based natural resource management. The most remarkable finding is that only in the irrigated areas do farmers' altruistic behaviour and contributory behaviour co-vary with their neighbours'. Provided there is no innate difference in behavioural traits between irrigated and rainfed rice farmers, which is partially supported by the descriptive tables, our result indicates that collective actions required in irrigation water management are likely to induce the emergence of social norms, in which farmers decide their social behaviour to be more or less similar to their neighbours.' Note, however, that this finding also implies that outcomes may not necessarily be pro-social because neighbourhood effect can reduce the high contributors' contribution to the neighbours' level, indicating the possibility of a vicious consequence of a conformism-type of norm dissemination.

Our analysis also shows that farmers' positive corrective response to their own free-riding behaviour in the irrigated areas may be also regarded as the emergence of social norms, through which individuals' free-riding acts are voluntarily corrected. While the message of dissatisfaction, a kind of costly punishment, effectively increases contribution in both ecosystems, the effect is greater on free riders only in the irrigated areas. It is thus inferred that increased demand for cooperative resource management in the real world also promotes a community mechanism of punishment that compensates for the function of social norms. Even though there are cooperative activities, such as the maintenance of communal spaces and the construction of village roads, that are equally common in both irrigated and rainfed areas, a distinct behavioural difference between the two ecosystems is detected. This is a thought-provoking observation on the impact of increased demand for collective irrigation water management on the evolution of social norms and community mechanisms.

Another important note is that the irrigation systems in the study site were introduced rather recently—two years before the data collection—which implies that by intervention schemes such as the construction of gravity irrigation, changes in social norms and community mechanisms can take place rather rapidly. This finding may not be surprising, as Goette *et al*. (2012) find that the tendency of cooperation and norm enforcement in the experimental games emerges after a few weeks of group formation in real society. Sustainability of new norms and community mechanisms amidst increasing heterogeneity among farmers, as well as within the experience of success or failure in irrigation management, is another important issue that we will leave for future research.

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Table 1 *Descriptive Statistics for Agricultural and Socioeconomic Variables by Irrigation Availability*

	(1) Overall (N=243)	(2) Irrigated Areas (N=132)	(3) Rainfed Areas (N=111)	(4) *t*-test for mean difference │(3)-(2)│ [p-value]	
Volumetric Pricing Dummy		0.561			
		(0.498)			
Age	51.062	49.689	52.694	3.004	*
	(12.019)	(12.248)	(11.585)	[0.052]	
Gender Dummy	0.708	0.758	0.649	0.109	*
	(0.456)	(0.430)	(0.480)	[0.063]	
Years of Schooling	6.395	6.144	6.694	0.550	
	(3.0384)	(2.922)	(3.159)	[0.160]	
Ln Asset	10.578	10.444	10.738	0.295	
	(1.132)	(1.193)	(1.038)	[0.718]	
Field Size (ha)	1.585	1.167	1.754	0.586	***
	(1.058)	(0.682)	(1.228)	[0.000]	
Household Size (head count)	5.936	6.144	5.689	0.455	
	(2.302)	(2.321)	(2.265)	[0.125]	
Household Female Ratio	0.500	0.484	0.519	0.035	*
	(0.162)	(0.148)	(0.176)	[0.092]	

Note: The sample means are presented. The standard deviations are in parentheses. *** and * indicate 1% and 10% statistical significance levels, respectively, for the mean difference between irrigated and rainfed areas. For the mean difference, absolute values are presented.
Source: Authors' calculation, with data collected by IRRI.

Table 2 *Descriptive Statistics for the Artefactual Field Experiment Results by Irrigation Availability*

	(1) Overall (N=243)	(2) Irrigated Areas (N=132)	(3) Rainfed Areas (N=111)	(4) *t*-test for mean difference │(3)-(2)│ [p-value]	
Dependent Variables					
Dictator Game	30.041	32.197	27.477	4.719	*
	(20.236)	(21.555)	(18.314)	[0.070]	
PG Game, Round 1	54.403	53.182	55.856	2.674	
	(23.033)	(22.080)	(24.139)	[0.368]	
PG Game, Round 2	52.140	51.818	52.523	0.704	
	(24.350)	(23.633)	(25.279)	[0.823]	
Controls					
Risk Preference	53.786	54.470	52.973	1.497	
	(25.898)	(24.380)	(27.686)	[0.655]	
PG Game, Rround 1 Message Receipt Dummy	0.280	0.273	0.288	0.016	
	(0.450)	(0.447)	(0.455)	[0.789]	
PG Game, Rround 1 Free-riding Index (FRI)	-0.110	0.455	-0.781	1.235	
	(15.335)	(14.746)	(16.049)	[0.533]	

Note: The standard deviations are in parentheses. * indicates 10% statistical significance level for the mean difference between irrigated and rainfed areas. For the mean difference, absolute values are presented.
Source: Authors' calculation with data collected by IRRI.

Table 3 *Neighbourhood Structure: Characteristics of the 4 Weight Matrices*

	------- Field Plot Neighbours -------			-------- Residential Neighbours -------		
	(1) Irrigated Areas	(2) Rainfed Areas	(3) *t*-test for mean difference │(2)-(3)│ [p-value]	(4) Irrigated Areas	(5) Rainfed Areas	(6) *t*-test for mean difference │(5)-(4)│ [p-value]
Weight Code	(a)	(b)		(c)	(d)	
Number of Observations	131	109		132	110	
Total Number of Links	860	1166		866	1292	
Non-zero Weights (%)	5.01	9.81		4.97	10.68	
Average Number of Neighbours	6.565	10.697	4.132	6.561	11.746	5.185
per Person	(2.649)	(4.309)	[0.000]	(3.119)	(5.409)	[0.000]
Average Distance between	0.603	0.587	0.016	0.583	0.574	0.009
Neighbours (km)	(0.236)	(0.239)	[0.137]	(0.243)	(0.252)	[0.414]

Note: Threshold Distance = 0.956 (km) is the distance that ensures that, for any one of the four neighbourhood structures, there is at least one neighbour for every observation. Standard deviations are in parentheses.

Table 4 *Diagnostic Tests for Spatial Regressions*

Game Experiment	Dictator Game				Public Goods Game, Round 1				Public Goods Game, Round 2			
Neighborhood	Field Plot		Residential		Field Plot		Residential		Field Plot		Residential	
Ecosystem	Irrigated	Rainfed	Irrigated	Rainfed	Irrigated	Rainfed	Irrigated	Rainfed	Irrigated	Rainfed	Irrigated	Rainfed
Weight Code	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)
Moran's I	0.042 *	-0.031	0.131 ***	-0.126	-0.087	0.060 ***	0.004	-0.010	0.119 ***	-0.016	0.162 ***	0.014 *
	(0.050)	(0.385)	(0.001)	(0.990)	(0.849)	(0.004)	(0.246)	(0.219)	(0.000)	(0.241)	(0.000)	(0.081)
	↓	↓		↓	↓		↓	↓	↓	↓	↓	↓
LM on Error Correlation	0.616		5.332 **			1.511			5.001 **		8.135 ***	0.083
	(0.433)		(0.021)			(0.219)			(0.025)		(0.004)	(0.773)
LM on Lag Correlation	3.034 *		7.854 ***			1.831			10.961 ***		9.849 ***	0.974
	(0.082)		(0.005)			(0.176)			(0.001)		(0.002)	(0.324)
Robust LM on Error Correlation	12.977 ***		2.540 †			0.623			0.375		0.214	1.165
	(0.000)		(0.111)			(0.430)			(0.540)		(0.644)	(0.281)
Robust LM on Lag Correlation	15.395 ***		5.062 **			0.943			6.335 **		1.928	2.055
	(0.000)		(0.024)			(0.332)			(0.012)		(0.165)	(0.152)
LM on SARMA	16.011 ***		10.394 ***			2.453			11.336 ***		10.062 ***	2.138
	(0.000)		(0.006)			(0.293)			(0.003)		(0.007)	(0.343)
	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
Spatial Model of Our Choice	Lag and Cross	Cross	Lag and Cross	Cross	Cross	Cross	Cross	Cross	Lag and Cross	Cross	Cross	Cross
For Robustness Check			ARAR and Cross								Lag and Cross	

Note: The p-values are in parentheses. ***, **, *, and † indicate 1, 5, 10, and 15 % statistical significance levels, respectively.

Table 5 *Spatial Regressions for the Dictator Game*

Neighbourhood	Field Plot		Residential		
Ecosystem	Irrigated	Rainfed	Irrigated		Rainfed
Spatial Model	Lag & Cross	Cross	Lag & Cross	ARAR & Cross	Cross
Weight Code	(a)	(b)	(c)	(c)	(d)
<u>Endogenous Social Effect</u>					
ρ	0.239 *		0.352 ***	0.331	
	(0.078)		(0.004)	(0.430)	
<u>Correlated Social Effect</u>					
λ				0.034	
				(0.948)	
<u>Neighbours' Characteristics</u>					
Volumetric Pricing Dummy	-13.630 *		-11.492 †	-11.601 †	
	(0.089)		(0.109)	(0.150)	
Age	0.123	0.060	-0.105	-0.128	0.445
	(0.740)	(0.923)	(0.763)	(0.763)	(0.505)
Gender Dummy	4.382	-24.624 *	11.062	11.584	8.701
	(0.589)	(0.077)	(0.195)	(0.258)	(0.514)
Years of schooling	-0.750	-4.222 *	-1.288	-1.322	1.294
	(0.609)	(0.062)	(0.391)	(0.383)	(0.617)
Ln Asset	-0.887	10.944 *	5.075	5.230	-1.344
	(0.827)	(0.051)	(0.200)	(0.218)	(0.735)
Field Area (ha)	16.206 ***	3.016	8.419 †	8.361	4.183
	(0.008)	(0.587)	(0.135)	(0.194)	(0.426)
Household Size	-2.513 †	-2.327	-1.876	-1.895	-2.070
	(0.140)	(0.545)	(0.275)	(0.317)	(0.525)
Household Female Ratio	-2.364	-2.837	21.705	23.196	-5.491
	(0.942)	(0.934)	(0.440)	(0.500)	(0.893)
<u>Own Characteristics</u>					
Volumetric Pricing Dummy	-2.131		-0.327	-0.371	
	(0.543)		(0.922)	(0.915)	
Age	-0.201	-0.091	-0.263 *	-0.266 *	-0.121
	(0.186)	(0.607)	(0.077)	(0.077)	(0.487)
Gender Dummy	2.914	3.098	3.526	3.605	5.631 †

	(0.484)		(0.433)		(0.385)		(0.407)		(0.143)	
Years of Schooling	0.610		0.282		0.221		0.213		0.334	
	(0.341)		(0.663)		(0.734)		(0.748)		(0.615)	
Ln Asset	-0.374		0.854		-0.308		-0.290		-0.347	
	(0.820)		(0.653)		(0.849)		(0.863)		(0.859)	
Field Area (ha)	-0.118		2.322	†	-0.956		-0.920		2.324	†
	(0.967)		(0.135)		(0.723)		(0.745)		(0.127)	
Household Size	-0.323		0.261		-0.377		-0.387		0.462	
	(0.664)		(0.759)		(0.613)		(0.610)		(0.613)	
Household Female Ratio	29.147	**	3.188		30.608	**	30.845	**	-4.975	
	(0.013)		(0.905)		(0.011)		(0.012)		(0.629)	
Intercept	31.840		-52.679		-29.964		-30.609	†	10.964	
	(0.470)		(0.441)		(0.494)		(0.150)		(0.846)	
Sample Size	131		109		132		132		110	
Fit of the Model										
Multiple R-squared			0.206						0.136	
Adjusted R-squared			0.088						0.009	
F Statistic			1.746	*					1.071	
			(0.059)						(0.394)	
Wald Statistic	3.865	**			11.480	***				
	(0.049)				(0.001)					
LR Test							8.159	**		
							(0.017)			

Note: The p-values are in parentheses. ***, **, *, and † indicate 1, 5, 10, and 15% statistical significance levels, respectively.

Table 6 *Spatial Regressions for the Public Goods Game, Round 1*

Neighbourhood	Field Plot				Residential			
Ecosystem	Irrigated		Rainfed		Irrigated		Rainfed	
Spatial Model	Cross		Cross		Cross		Cross	
Weight Code	(a)		(b)		(c)		(d)	
<u>Neighbours' Characteristics</u>								
Volumetric Pricing Dummy	-9.637				-11.411	†		
	(0.273)				(0.147)			
Age	-0.623	†	0.548		-0.682	*	-0.520	
	(0.131)		(0.516)		(0.074)		(0.559)	
Gender Dummy	-9.676		19.125		-10.821		35.160	**
	(0.279)		(0.314)		(0.244)		(0.049)	
Years of Schooling	-0.152		-0.088		0.533		-1.508	
	(0.926)		(0.978)		(0.755)		(0.672)	
Ln Asset	0.013		-3.671		3.425		-3.891	
	(0.998)		(0.624)		(0.440)		(0.462)	
Field Area (ha)	8.575		-7.042		2.966		5.672	
	(0.190)		(0.347)		(0.633)		(0.418)	
Household Size	-1.822		-0.502		1.453		0.633	
	(0.328)		(0.924)		(0.440)		(0.884)	
Household Female Ratio	11.186		11.712		-8.118		31.177	
	(0.751)		(0.798)		(0.790)		(0.567)	
<u>Own Characteristics</u>								
Volumetric Pricing Dummy	0.221				0.217			
	(0.955)				(0.954)			
Age	-0.450	***	-0.713	***	-0.441	***	-0.743	***
	(0.008)		(0.004)		(0.008)		(0.002)	
Gender Dummy	-4.709		-3.032		-5.778		-2.514	
	(0.305)		(0.568)		(0.195)		(0.624)	
Years of Schooling	0.112		-0.194		0.236		-0.044	
	(0.876)		(0.824)		(0.744)		(0.960)	
Ln Asset	2.323		2.589		1.307		0.981	
	(0.201)		(0.312)		(0.465)		(0.708)	
Field Area (ha)	5.586	*	-2.125		5.754	*	-1.965	
	(0.069)		(0.315)		(0.054)		(0.334)	
Household Size	-0.742		-0.717		-0.575		-0.889	

	(0.367)		(0.531)		(0.486)		(0.469)	
Household Female Ratio	20.000	†	-18.463		18.812		-14.913	
	(0.125)		(0.191)		(0.155)		(0.286)	
Control								
Risk-Taking Behaviour	0.227	***	0.132		0.215	***	0.135	†
	(0.006)		(0.167)		(0.010)		(0.134)	
Intercept	69.559		87.550		39.920		121.884	†
	(0.153)		(0.346)		(0.411)		(0.107)	
Sample Size	131		109		132		110	
Fit of the Model								
Multiple R-squared	0.232		0.185		0.256		0.218	
Adjusted R-squared	0.117		0.054		0.145		0.093	
F Statistic	2.012	**	1.409		2.302	***	1.741	*
	(0.016)		(0.159)		(0.005)		(0.056)	

Note: The p-values are in parentheses. ***, **, *, and † indicate 1, 5, 10, and 15% statistical significance levels, respectively.

Table 7 *Spatial Regressions for the Public Goods Game, Round 2*

Neighbourhood	Field Plot				Residential					
Ecosystem	Irrigated		Rainfed		Irrigated				Rainfed	
Spatial Model	Lag & Ccross		Cross		Cross		Lag & Cross		Cross	
Weight Code	(a)		(b)		(c)		(c)		(d)	
Endogenous Social Effect										
ρ	0.332	***					0.284	***		
	(0.001)						(0.004)			
Neighbours' characteristics										
Volumetric Pricing Dummy	1.337				11.436	*	-6.470			
	(0.831)				(0.076)		(0.258)			
Age	-0.317		-0.584		-0.276		-0.221		-0.579	
	(0.289)		(0.406)		(0.377)		(0.418)		(0.467)	
Gender Dummy	0.439		14.381		-3.750		-1.077		25.875	†
	(0.945)		(0.364)		(0.627)		(0.874)		(0.116)	
Years of Schooling	-2.103	*	3.266		1.360		0.428		1.365	
	(0.070)		(0.215)		(0.331)		(0.731)		(0.665)	
Ln Asset	2.964		-0.095		-1.520		-1.265		-3.677	
	(0.354)		(0.988)		(0.680)		(0.694)		(0.437)	
Field Area (ha)	0.574		2.848		8.166	†	3.265		4.391	
	(0.903)		(0.653)		(0.111)		(0.480)		(0.482)	
Household Size	-0.577		3.104		0.798		0.224		4.020	
	(0.670)		(0.485)		(0.606)		(0.868)		(0.301)	
Household Female Ratio	-8.270		19.684		35.690		-28.779		-19.813	
	(0.742)		(0.610)		(0.157)		(0.189)		(0.683)	
Own Characteristics										
Volumetric Pricing Dummy	3.199				3.314		4.083	†		
	(0.243)				(0.280)		(0.128)			
Age	0.167		-0.169		0.179		0.187	†	-0.089	
	(0.170)		(0.429)		(0.193)		(0.120)		(0.692)	
Gender Dummy	2.492		0.145		0.690		2.059		-0.156	
	(0.438)		(0.974)		(0.849)		(0.517)		(0.973)	
Years of Schooling	0.371		0.214		0.385		0.366		0.322	
	(0.466)		(0.769)		(0.516)		(0.481)		(0.682)	

Ln Asset	1.746		0.954		1.110		1.330		0.387	
	(0.171)		(0.661)		(0.447)		(0.297)		(0.869)	
Field Area (ha)	-0.716		-2.529		1.028		0.302		-2.671	†
	(0.749)		(0.154)		(0.681)		(0.890)		(0.142)	
Household Size	0.613		0.219		0.567		0.517		0.144	
	(0.291)		(0.821)		(0.405)		(0.384)		(0.895)	
Household Female Ratio	7.872		-5.448		2.114		5.034		-6.961	
	(0.393)		(0.663)		(0.846)		(0.598)		(0.586)	
<u>Controls</u>										
Risk-Taking Behaviour	0.126	**	0.252	***	0.193	***	0.161	***	0.240	***
	(0.034)		(0.002)		(0.006)		(0.008)		(0.003)	
Round 1, Message D	7.312	**	11.574	**	7.139	*	7.416	**	11.731	**
	(0.039)		(0.041)		(0.080)		(0.036)		(0.050)	
Round 1, Free-Riding Index (FRI)	0.212	*	0.014		0.232	*	0.266	**	0.093	
	(0.090)		(0.940)		(0.090)		(0.026)		(0.624)	
Round 1, Message D x FRI	0.440	**	-0.358		0.471	*	0.419	**	-0.289	
	(0.044)		(0.238)		(0.053)		(0.047)		(0.361)	
Round 1, Result	0.847	***	0.542	***	0.821	***	0.840	***	0.584	***
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
<u>Intercept</u>	-56.946	†	-22.235		-2.661		-19.659		34.196	
	(0.117)		(0.774)		(0.949)		(0.587)		(0.620)	
<u>Sample Size</u>	131		109		132		132		110	
<u>Fit of the Model</u>										
Multiple R-squared			0.511		0.591				0.476	
Adjusted R-squared			0.406		0.513				0.365	
F Statistic			4.884	***	7.558	***			4.300	***
			(0.000)		(0.000)				(0.000)	
Wald Statistic	13.042	***					9.141	***		
	(0.000)						(0.002)			

Note: The p-values are in parentheses. ***, **, *, and † indicate 1, 5, 10, and 15% statistical significance levels, respectively.

Table 8 *Robustness Checks for Spatial Regressions: the Dictator Game and the Public Goods Game, Round 1*

Neighbourhood	Field Plot		Residential	
Ecosystem	Irrigated	Rainfed	Irrigated	Rainfed
Dictator Game				
[W1] 6-nearest Neighbours Model				
Spatial Model	Lag & Cross	Cross	Lag &Cross	Cross
Endogenous Social Effect (ρ)	0.195 †		0.238 †	
	(0.148)		(0.101)	
Sample Size	131	109	132	110
[W2] 1/d Distance Decay Neighbourhood Model				
Spatial Model	Lag & Cross	Cross	Lag &Cross	Cross
Endogenous Social Effect (ρ)	0.484		0.487 †	
	(0.151)		(0.150)	
Sample Size	131	109	132	110
[W3] Village Neighbours Model				
Spatial Model			Cross	Cross
Endogenous Social Effect (ρ)				
Sample Size			129	110
Public Goods Game, Round 1				
[W1] 6-nearest Neighbours Model				
Spatial Model	Cross	Cross	Cross	Cross
Endogenous Social Effect (ρ)				
Sample Size	131	109	132	110
[W2] 1/d Distance Decay Neighbourhood Model				
Spatial Model	Cross	Cross	Cross	Cross
Endogenous Social Effect (ρ)				
Sample Size	131	109	132	110
[W3] Village Neighbours Model				
Spatial Model			Cross	Cross
Endogenous Social Effect (ρ)				
Sample size			129	110

Note: The p-values are in parentheses. ***, **, *, and † indicate 1, 5, 10, and 15% statistical significance levels, respectively.

Table 9 *Robustness Checks for Spatial Regressions: the Public Goods Game, Round 2*

Neighbourhood	Field plot				Residential			
Ecosystem	Irrigated		Rainfed		Irrigated		Rainfed	
[W1] 6-nearest Neighbours Model								
Spatial Model	Lag &Cross		Cross		Error &Cross		Cross	
Endogenous Social Effect (ρ)	0.358	***						
	(0.001)							
Correlated Social Effect (λ)					0.376	***		
					(0.006)			
Round 1, Message D	7.480	**	10.778	*	8.020	**	9.978	*
	(0.036)		(0.066)		(0.022)		(0.089)	
Round 1, Free-Riding Index (FRI)	0.229	*	0.040		0.296	**	0.045	
	(0.065)		(0.835)		(0.013)		(0.807)	
Round 1, Message D x FRI	0.453	**	-0.253		0.350	*	-0.220	
	(0.038)		(0.407)		(0.096)		(0.470)	
Sample Size	131		109		132		110	
[W2] 1/d Distance Decay Neighbourhood Model								
Spatial Model	Cross		Cross		Cross		Cross	
Endogenous Social Effect (ρ)	0.510	*			0.514	*		
	(0.097)				(0.095)			
Round 1, Message D	7.370	**	11.469	*	7.365	**	12.808	*
	(0.031)		(0.046)		(0.030)		(0.089)	
Round 1, Free-Riding Index (FRI)	0.289	**	0.019		0.291	**	0.071	
	(0.015)		(0.930)		(0.014)		(0.807)	
Round 1, Message D x FRI	0.309	†	-0.220		0.305		-0.232	
	(0.150)		(0.477)		(0.154)		(0.470)	
Sample Size	131		109		132		110	
[W3] Village Neighbours Model								
Spatial Model					Cross		Cross	
Endogenous Social Effect (ρ)								
Round 1, Message D					7.144	*	10.262	*
					(0.058)		(0.082)	
Round 1, Free-Riding Index (FRI)					0.298	**	-0.005	
					(0.020)		(0.977)	
Round 1, Message D x FRI					0.338	†	-0.133	
					(0.136)		(0.677)	
Sample Size					129		110	

Note: The p-values are in parentheses. ***, **, *, and † indicate 1, 5, 10, and 15% statistical significance levels, respectively.

Fig. 1. Map of the Survey Site in Bohol, Showing the Location of Sample Farmers' Residences

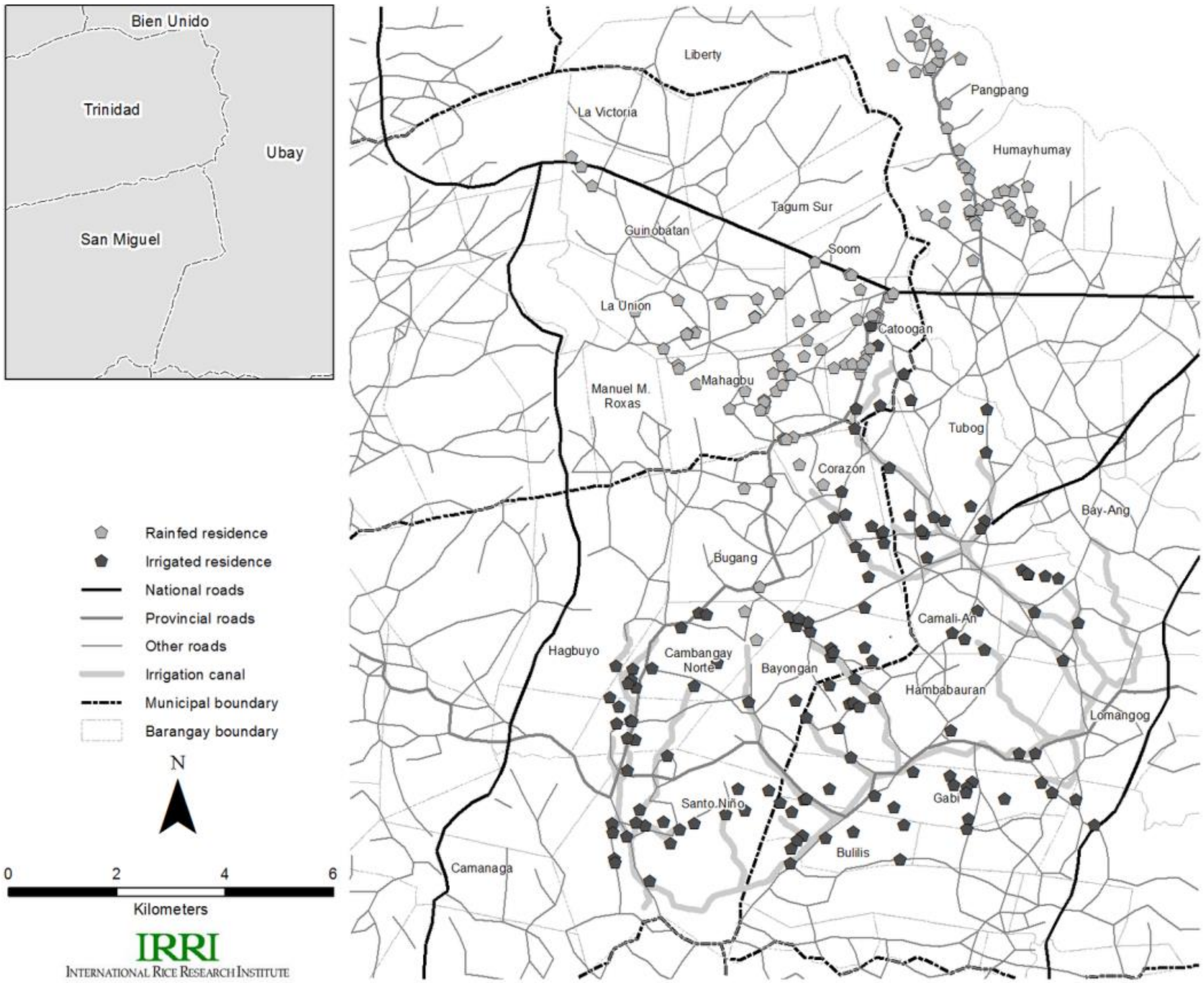
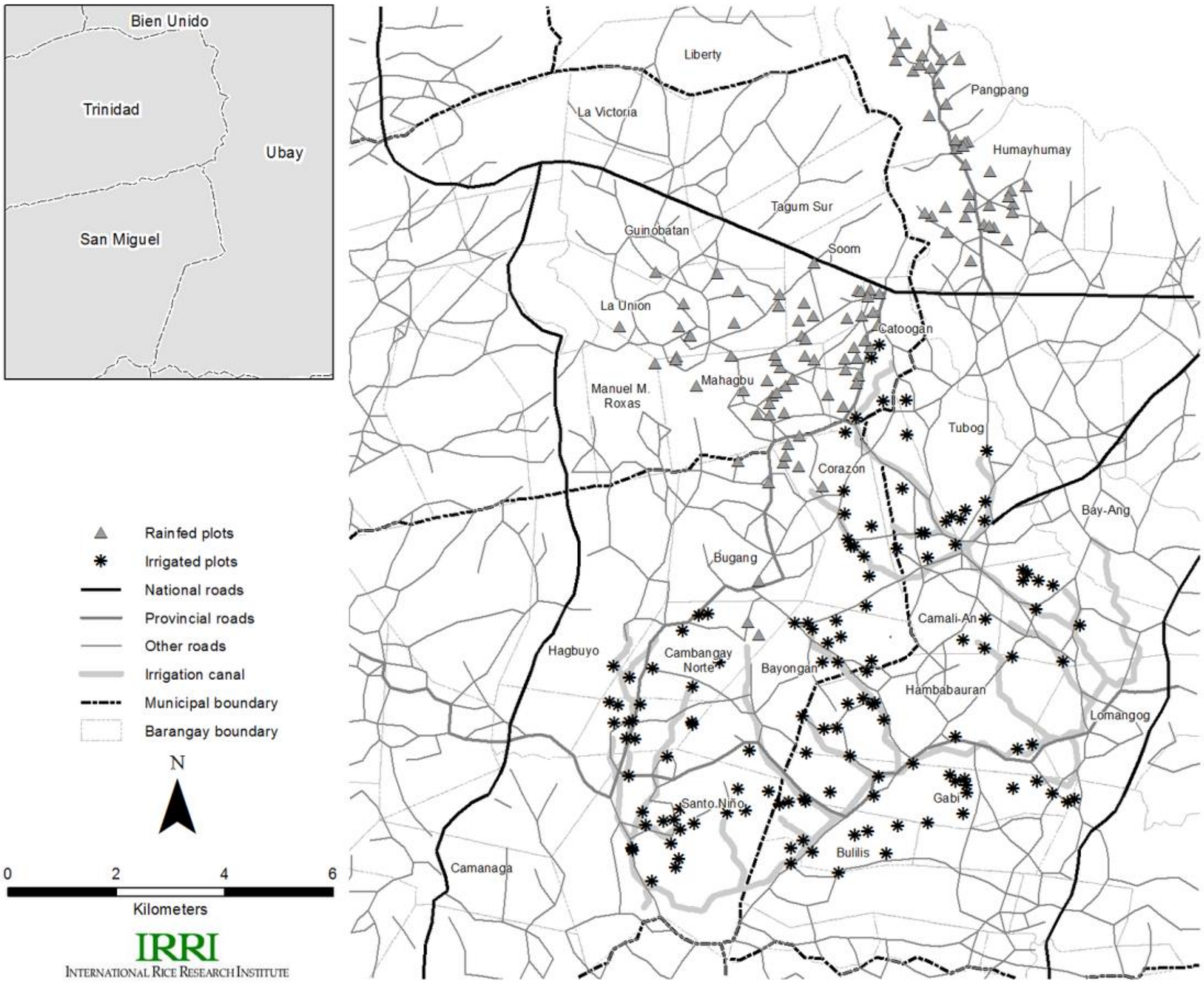


Fig. 2. Map of the Survey Site in Bohol, Showing the Location of Sample Farmers' Plots



Appendix A. Experiment instructions, with remarks in square brackets.

[The following instructions were read to the participants in *Cebuano*, the local language in the study site, with a visual presentation on the screen.]

1. Introduction

Thank you all for taking the time to come today. Today's workshop may take a whole day, so if you think you will not be able to stay that long, let us know now. Before we begin I want to make some general comments about what we are doing here today and explain the rules that we must follow. We will be playing games with money. Whatever money you win will be yours to take home. The amount you will get paid depends on the decisions you and everyone else make during the games. After the completion of all games, we will choose one game randomly and money you win in this chosen game will be yours to take home. Expected money you can get in each game is more or less same. So, we would like you to take the game seriously. You should understand that this is not my own money. It is money given to me by Japan International Cooperation Agency. There are many researchers in different countries in North America, South America, Asia, and Africa playing these same games. Before we proceed any further, let me stress something that is very important. Many of you were invited here without understanding very much about what we are planning to do today. If at any time you find that this is something that you do not wish to participate in for any reason, you are of course free to leave even after we already started the game.

We will have six games and one interview session here today. If you have heard anything about any other games, you should try to forget about that. These games are completely different. It is important that you listen as carefully as possible, because only people who understand the games will actually be able to play. We will run through some examples here while we are all together. We would like you to take the game seriously and we would like to ask you not to talk to other participants during the entire event. This is very important. Please be sure that you follow this rule, because it is possible for one person to spoil the game for everyone.

You have already gotten Philippine Pesos (P, hereafter) 50 as a show up fee.[31] So if you follow the rules we will give each one of you the rest of the show up fee, P100, at the end of all experiments. Then the total show up fee is P 150. However, if during the game you talk to other participants or do not follow the rules in any other way, we will not pay P 100 at the end. Do not worry if you do not completely understand the game as we go through the examples here in the group. Each of you will have a chance to ask questions to be sure that you understand how to play.

Any decisions you make in the exercises or any responses you give us during the interview will be strictly confidential. We will never tell anyone your responses or decisions. To assure your responses are confidential, we ask you not to speak to each other until the entire experiment is completed.

[31] One US dollar is equivalent to about P 40 as of August 2012.

[Of six games we conducted, we explain herewith three that we have used in this paper. The instruction of the other games is available upon request to the authors.]

2. Dictator Game

This game is played by a pair of individuals. Each of all participants will be paired with one of the other participants who are sitting in the other room. But nobody is informed of exactly who your partner is either during or after the experiment. Only we know who is to play with whom and we will never tell anyone else. Your decisions in this game will be confidential; none of the other participants will ever know the decisions you make. At the beginning of the game we will provide you with two envelopes. One envelope contains your ID number, three photos with their names which are bundled, two answer sheets, one P 50 bill, two P 20 bills, and two P 5 coins.

[We used a strategy method to obtain answers in different cases. In this game, eight cases were used. Five cases (which will be explained later) were fixed for all participants and shown on the first answer sheet. For the rest, we assigned three different partners (the photos in the envelope) to each participant. The partners were chosen from the game participants in the other room. The second answer sheet had the spaces to fill the names of assigned partners.]

I would like you to write down your name in the top right name space and copy your ID number which is given with the envelope to the top right ID space. Then, copy the name specified on the first photo to the first row on the second answer sheet, the name on the second photo in the second row and the name on the third photo in the third row. Don’t change the order of photos. Please keep your ID number and three photos during the day. We will use them later again.

You have a partner in the other room. Only you receive P 100 but your partner does not. You will then have an opportunity to give a portion of your P 100 to your partner. Choose one of the eleven possible divisions of the P 100 between you and your partner. You can give P 100, P 90, P 80, P 70, P 60, P 50, P 40, P 30, P 20, P 10, or can choose to give nothing. The amount you keep is your final payoff and the transferred amount is your partner’s final payoff. Please consider how much money you want to send to your partner.

Let’s see a few examples. Your partner is sitting in the other room and only you are given P100. Imagine that you decide to give P 50, a half of your initial endowment, to your partner. You are left with P 50. At the end of game you will have P 50 and your partner will have P50. You have several choices. If you keep all of P 100 like person B [example of person B on the screen, the same applies in the following description.], at the end of game you will have P 100 and your partner will have nothing. Contrary, if you send everything like person C, this time, at the end of game you will have P 0 and your partner will have all of P100. Note that the amount you keep is your payoff of this game. The amount your partner receives from you is the payoff of your partner. These are only examples. Each of you will decide, on your own, how to allocate the P 100 between you and your partner. It is important that you understand how the game runs.

[Exercises were conducted to ensure that participants understood the rules of the game.]

We will now explain how to fill the answer sheets. Your potential partner is someone listed on one of the answer sheets which was distributed with the envelope; (1) someone in your Purok, (2) someone in your Barangay, (3) someone in your TSA member in your Barangay, (4) someone in your TSA member in a different Barangay, (5) someone in your Municipal.[32] [The order of the cases was randomly shown on the answer sheet to avoid the order effect (i.e., the tendency which might arise when the cases change according to some rule.) Since TSAs (water users associations) exist only in irrigated area, these cases were asked only for the participants from irrigated area.] In addition, in three cases of transaction, we specify the name of your partners which were listed on the other answer sheet. In this case, you know who your partner is, but your partner will never know from whom the money comes. It is confidential.

First, you consider how much money you want to send to your potential partner on the list respectively, and then check the box in the answer sheets. For example, if you would like to send P 40 to the partner in the first row, please check the box of P 40 in that row. Continue this exercise for each partner. You should consider each case one by one. Do not talk to the other people during your decision making. To protect the privacy of your decisions, please insert your answer sheets into the envelope we provided to you.

Are there any questions about how the game will proceed? Please fill the answer sheets. Put the filled answer sheets back to the envelope. But retain 3 photos of your partners and ID card with you. We will use them again.

3. Public Goods Game

[We conducted three rounds of this game. In this paper, we use the results of the last two rounds only (i.e., public goods game with punishment).]

This game is similar to a project by a group of people. To understand this game, think about how you allocate your time. You spend part of your time doing things that benefit you or your family only. You spend another part of your time doing things that help everyone in your community including yourself. Specifically, you might spend part of your time hauling or purifying water for your family and you may spend part of your time cleaning or maintaining the community water supply which benefits everyone including you. Another example is that you spend part of your time working for pay or fixing your house. This activity only benefits your family. However, you might spend part of the time cleaning up the neighbourhood which benefits everyone. This game is meant to be similar to this sort of situation where you must decide between doing something that benefits you only or something that benefits everyone in a group.

At the beginning of the game we will provide you with an envelope. It contains an answer sheet, one P 50 bill, two P 20 bills, and two P 5 coins. I would like you to write down your name in the top right name space and copy your ID number which is given with the envelope to the top right ID space.

[32] *Purok* is an informal sub-unit of a village. *Barangay* corresponds to the concept of village. TSA indicates water users association.

[We used a strategy method for this game, specifying four fixed cases (which will be explained later). The three individual partners in the photos were no longer used. Therefore, the instructions on how to fill the assigned partners' names were no longer given.]

As the previous game [the previous game refers to a kind of game played by a group of four people], we set up a group of people you play with. There are three other people in your group. All of them are sitting in the other room. Each person in the group will then decide how much to allocate to a group project and how much to keep for himself or herself. Everyone in the group benefits equally from the money allocated to the group project. After all group members have decided how much out of P 100 to allocate to the group project, we will add up all the money by group. When we know the total, we will double it. You will not know how much any specific person in your group allocated to the group project. Each person will then receive an equal share of the doubled amount regardless of how much money he or she contributed to the group project.

Let's see five examples. [First example] Each person decides how much to allocate to the group project privately, so you will not know what anyone else has decided when you make your choice. Imagine that everyone in your group, including you, allocate P 50 to the group project. In total there is P 200. We will double this amount which makes the total P 400. Each of you then receives an equal share of the P 400. We would give you each P 100. At the end of game you will have P 100 from the group project and P 50 that you kept. You will get a total of P 150. [Second example] To continue the example, imagine that this time everybody allocate all money to the group project. In total there are P 100+P 100+P 100+P 100=P 400 in the group project. We double this amount which makes the total P 800. Each person receives an equal share of the P 800. At the end of game you will have P 200 from the group project. As you kept nothing, you will get P 200+P 0= P 200. The rest of the group will also receive P 200 from the group project. [Third example] Let's continue the example. Now say that all of you allocate nothing to the group project. The group project will have a total of P 0+P 0+P 0+P 0=P 0. We have nothing to double. Then the game is over. Each person receives nothing from the group project. At the end of game, you have P 100 which is kept for yourself. Other group members also have P100. [Fourth example] To continue the example, imagine that this time you allocate no money to the group project. Imagine that the three other people in your group allocate P50 to the group project. In total there are P 0+P 50+P 50+P 50=P 150 in the group project. We double this amount which makes the total P 300. Each person receives an equal share of the P 300. You can also get an equal share even though your contribution is zero. So, at the end of game you will have P 75 from the group project and P 100 that you kept. You will get P 75+P 100= P 175. The rest of the group will also receive P 75 from the group project. In total, each of the three other group members will get P 75+P 50=P 125. They receive P 75 from the group project and have P 50 that they kept. [Fifth example] Let's continue the example for one more. Now say that you allocate everything to the group project and keep nothing. Say that the other group members allocate nothing to the group project. The group project will have a total of P 100. We double this amount which makes the total P 200. Each person receives an equal share of P 200. Each person receives P 50 from the group project. At the end of game, you receive P 50 from the group project. The other group members who kept all P 100 get P 50 from the group project, even though their contribution is zero. In total they receive P 150. These are only examples. Each of you will decide, on your own, how to allocate the P 100. It is important that you understand how the game runs.

[Exercises were conducted to ensure that participants understood the rules of the game.]

We now explain how to fill the answer sheet. You make decisions at different levels of groups: (1) 4 Purok members, (2) 4 Barangay members, (3) 4 TSA members, (4) 4 people in the same Municipal. [The order of the cases was randomly shown on the answer sheet to avoid the order effect. Since TSAs exist only in irrigated area, the third case was asked only for the participants from irrigated area.] Please consider how much money you want to contribute to your potential group on the list one by one, and then check the box. You can invest P 100, P 90, P 80, P 70, P 60, P 50, P 40, P 30, P 20, P 10, or can choose to invest nothing.

[After a question and answer session, we asked participants to fill out the answer sheet.]

We will continue this game. The rule of the game is the same as the previous round until making contribution. However, after making contribution, by paying P 1 of cost, you can secretly see the contribution from each partner. Then, you can send a message to particular partners to indicate that you are unhappy with that person's contribution. To do so, you have to pay P 1 per message. This game will be played with the same members twice.

[After providing participants with an envelope containing an answer sheet and money, we gave them instructions on how to fill in their names and ID numbers on the answer sheet.]

Here are a few examples. [First example] After we calculate your return, each person will meet with us individually outside of the room. In this meeting, we will show you the total contribution to the group project and the total return to the group. In this example, the total contribution is P 140 and the total return is P 280. This amount is equally shared with the members. So, your return is P 70. Adding the amount you kept at hand initially (P 50), your total payoff is P 120. In this meeting, if you pay P 1 we reveal you the contribution of each member. In this example you will know that one person contributed P80, another did so P 10, and the last did not contribute at all. Note however, that group members are indicated as A, B, and C, and thus you cannot identify who they are.

You may continue the game as follows. If you are unhappy with the contribution of someone, you can pay, from your payoff for the round, P 1 per message to send a message of disapproval. [We used an 'unhappy face' icon card as a message and explained on the screen that it was the message they could send.] That is, if you want to send a message to one person that you are unhappy with his/her contribution, you have to pay P 1; to send messages to two people, P 2; for three, P 3. In this example, you pay P 1 to reveal the contribution and P 2 to send two messages. So, your final payoff is P 120-P 1-P 2=P 117.

In order to send a message to someone, simply indicate the person(s) when you are shown the card with everyone's contributions and incomes. There is no need to write a message or deliver a message yourself—we will perform these tasks—and you can only send a message if you chose to pay to see the contributions of the others. If a player receives a message, he/she may increase his/her contribution in the next round of the game. However, it is also possible that he/she does not change the contribution level even if he/she receives a message.

At the beginning of the following round, we will give you a new envelope. Inside the envelope, you may find disapproval messages that have been sent to you. Note that you cannot know which member of your group sent the message. In this example, you receive 2 messages, meaning that two members of your group were unhappy about your contribution. If there is no card, then no one decided to send you a message. Only the sender and the receiver will know that there was a message, and there is no obligation to change your decision if you receive a message.

[Second example] In this example, after making your contribution (P 50), you will know that the total contribution is P 140, the total return is P 280, and your return is P 70. In the meeting, we ask you if you want to see the other member's contribution. If you decide not to see a card, then the round ends up and we move to decision making for the next round. In this case, you don't have an opportunity to send a message of disapproval. Your final income for this round is P 120.

[Third example] Next example, you are informed that the total contribution is P 330, the total return is P660, and your return is P 165. If you decide to see a card by paying P 1 , you will find that Player A contributed P 80, Player B P 90, Player C P 80, and you P 80. If you decide not to send a message of disapproval to anyone, then the round ends up, and we move to decision making for the next round. At the end of game you will have P 165 from the group project and P 20 that you kept. You paid P 1 for seeing a card, so you will get a total of P 184.

[Fourth example] You are informed that the total contribution is P 160, the total return is P 320, and your return is P 80. If you decide to see a card by paying P 1, you will find that Player A contributed P 80, Player B P 10, Player C P 0, and you P 70. If you wish to send messages of disapproval to Player B and Player C, then it costs you P 1+P 1=P 2. At the end of game you will have P 80 from the group project and P 30 that you kept. You paid P 1 for seeing a card and P 2 for sending two messages, so you will get a total of P 107. The messages will be included in the envelope of each player in the next round. The player who receives them will not know who sent the message.

We explain how to fill the answer sheet. In this game, you have to answer for only one case; your three group members are from your Barangay. This is the example of answer sheet. [An answer sheet with only one case was shown.]

[After a question and answer session, we asked participants to fill out the answer sheet.]

Now we will ask whether you want to monitor each member's contribution and send messages to them one by one.

[We invited each participant over and asked him/her if he/she wanted to monitor and send an unhappy message.]

Now we proceed to the next round.

[After providing participants with an envelope containing an answer sheet and money, we gave them instructions on how to fill in their names and ID numbers on the answer sheet. This time, message(s) may be included in the envelope.]

Your envelope may contain disapproval messages that have been sent to you. Note that you cannot know which member of your group sent the messages. Now, again decide how much you contribute to the group project.

[We asked participants to fill out the answer sheet.]

4. Risk Game

This game is played by one person alone. Decision by others has nothing to do with your final payment. You will receive P 100. Then you will have an opportunity to bet out of this money. Your winnings depend on the card you select. After your decision making, you will pick a card from six. Each card has the number from one to six. If you picked card one you will lose the money you bet. If you picked card two, you will lose half of the money you bet. If you picked card three, you will recoup your bet, thus you will neither lose nor win money. If you picked card four, you will receive 1.5 times your bet. If you picked card five, you will double your bet, and if you picked card six, you will win 2.5 times your bet. Thus, card number one and two are bad, three is neither good nor bad, and four, five, and six are good.

[After providing participants with an envelope containing an answer sheet and money, we gave them instructions on how to fill in their names and ID numbers on the answer sheet.]

Here are two examples. [First example] Imagine that you bet P 20. You are left with P 80. You pick one of six cards. It is card five. This means that you double your bet. You bet P 20, and two times P 20 is P 40. Thus you have the P 80 plus the P 40, resulting in your total earnings of P 120. [Second example] Imagine that you bet nothing. You are left with all P 100. There is no need for you to pick the card. Your earning is P100.

[Exercises were conducted to ensure that participants understood the rules of the game.]

We explain how to fill the answer sheet. You can bet P 100, P 90, P 80, P 70, P 60, P 50, P 40, P 30, P 20, P 10, or can choose not to bet.

[After a question and answer session, we asked participants to fill out the answer sheet.]

Original *Cebuano* version

1. Introduction

Salamat sa inyong pag gahin ug panahon karong adlawa. Ang mga actibidades nato karon gipaagi nato ug mga dula ug mahuman hangtod sa hapon, kon aduna kaninyo nga dili makalampos sa pagtambong palihug lang ug pahibalo kanamo. Sa dili pa kita magsugod, ako una nga ibasabot kaninyo ang atong pagahimu-on ug ang mga reglamento nga atong paga sundon. Ang atong pahahimu-on karon gipaagi ug mga dula, ug ang matag dula adunay katumpas nga kwarta. Kon pila ang imong madaug maoy imong mdala pag-uli sa inyo. Ang kantidad nga imong madalanagadepende sa imong desesyon ug sa desesyon sa mga tawo nga apil niini. Pagkahuman sa tanang mga dula magpili ug usa ka dula pinaagi sa random diin kon pila ang imong madaug sa maong dula mao usab ang kantidad nga imong madala sa pag-uli. Kasagaran ang kantidad nga madaug sa matag dula magka parehas ra usab. Busa among gipanghinaot nga inyong seryosohon ang atong mga dula. Atong hinumduman nga dili kini akong kaugalingong kwarta. Kining maong kwarta nagaguikan sa Japn International Cooperation agency (JICA). Daghan usab ang mga researchers sa ubang nasud sa america asia ug africa nga misagup niining maong klase sa mga dula. Sa dili pa kita mupadayon, nahibalo kami nga daghan kaninyo nga gui imbetar nga wa kaayo masabte kon unsa ang among pagabuhaton karon. Kon pananglitan inyong makita nga dili ka muangay nga moapil sa unsa nga rason, pwede ka nga mouli bisan ug nagsugod na ang dula.

Adunay unom ka mga dula ug interview sesyon nga atong pagahimuon karon. Kon adunay laing dula nga inyong nadungog, kalimti sa ninyo. Lahi kini nga klase nga mga dula. Importante ang inyong pagsabot niining maong dula. Adunay mga examle nga atong ipakita para dugang masabtan ang pamaagi sa dula. Among panghinaut nga inyong seryosohon kining maong dula ug dili mo mag estoryahanay sa panahon sa dula. Ug among guihangyo nga inyong sundon ang mga reglamento tungod kay pwede maguba ang resulta sa maong dula bisan sa usa lamang nga dili mosunod.

Amo na kamong guihatagan ug P50 isip bayad sa pagtambong, kon mosunod mo sa patakaran, among ihatag ang P50. Ug lain nga P100 pagkahuman sa atong aktibidad karong adlawa. Sa katibuk-an adunay kamoy P150. Apan sa panahon sa dula kon dili ka mosunod sa patakaran, dili namo ihatag pagdayon ang P100. Ayaw kabalaka kon wala pa kayo nimo hisabti ang pama-agi sa dula aduna kitay mga ehimplo aron masabtan pag-ayo ang atong dula. Ang matag-usa adunay kahigayunan sa pagpangutana masabtan kon unsaon pagdula.

Ang inyong tubag sa atong mga dula ug mga pangutana sa interview dili mahibaluan sa uban (confidential). Para pagsiguro nga dili mahibaluan sa uban, amo kamong guihangyo sa dili pagpakigsulti sa inyong mga kauban hangtud mahuman ang atong aktibidad.

[Sa onum ka dula nga gihimo, among gipasabot ang tulo nga among gigamit niining maong papel. Ang mga pagtudlo sa uban pang mga dula anaa ra pwede mahatag kon mangayo gikan sa tagsulat.]

2. Dictator Game

Kining maong dula himu-on sa pares-pares. Ang matag usa sa tanang participants guipares sa usa sa mga participants sa pikas kwarto. Apan walay usa kaninyo ang nahibalo kon kinsa ang iyang kapares sa panahon sa experiment o bisan sa pagkahuman na niini. Kami lamang ang nahibalo ug dili usab kamo namo pahibalo-on kon si kinsa ang kapares. Ang inyong desisyon o tubag sa maong dula dili mahibalo.an ni bisan kinsa sa mga participants (confedintia). Sa pagsugod sa dula, amok among hatagan ug duha ka subre. Sa usa ka subre anaaang imong numero sa ID tulo ka letrato u gang ilang pangalan, duha ka papel sulatan sa tubag, usa ka P50 bill, duha ka P20 bills, ug duha ka P5 nga coin.

[Among gigamit ang strategy method aron pagkab-ot ug mga tubag sa managlahi nga sitwasyon. Niining maong dula, walo ka sitasyon ang gigamit. Lima ka sitwasyon (nga ipasabot sa unahan) pareho sa tanang magdudula nga makita sa unang answer sheet. Ug sa uban sitwasyon, aduna kami gihan-ay nga tulo ka kapares (ang mga hulagway anaa sulod sa subre) sa matag magdudula. Ang mga kapares gipili gikan sa mga magdudula sa pikas nga kwarto. Ang ikaduhang answer sheet adunay luna sulatan sa pangalan sa nakahan-ay nga kapares.]

Palihug ug sulat sa inyong pangalan sa ibabaw ug tuong bahin sa papel ug isulat usab sa papel ang inyong numero sa ID nga anaa sa sulod sa subre ibabaw sa inyong ngalan. Isulat usab ang pangalan nga anaa sa unang litrato diha sa unang linya sa (answer sheet) and ikaduhang litrato sa ikaduhang linya u gang ikatulong litrato sa ikatulo nga linya. Ayaw usba ang han-ay sa mga litrato. Palihug pod ug kupot ug pag amping sa imong ID ug sa tulo ka mga litrato sa tibu-ok adlaw kay ato nang gamiton sa uban pang mga actividades.

Aduna kay kapares sa pikas kwarto. Ikaw raang adunay P100 ang imong pares wala. Ikaw adunay kahigayunan paghatag tipik sa imong P100 ngadto sa imong pares. Magpili ka kon pila ang imong ihatagsa napo'g usa ka kapili-an sa P100 diha kanimo ug sa imong pares. Pwede ka nga mohatag ug P100, P90, P80, P70, P60, P50, P40, P30, P20,P10, ug pwede pod nga dili ka mohatag ngadto sa imong pares (P0). Kon pila ang imong ibilin mao silbi ang imong daug, u gang imong gihatag ngadto sa imong pares mao usab kana ang kantidad isip iyang daug. Busa imong hunahunaon kon pila ang angay nimo nga ihatag ngadto sa imong pares.

Atong tan awon ang pipila ka mga ehimplo kon unsa on. Ang imong pares anaa sa pikas kwarto ug ikaw lamang ang gihatagan ug P100. Pananglitan mihatag ka ug P50 katunga sa imong kwarta ngadto sa imong pares. Ang mahibilin diha kanimo P50 usab. P agkahuman sa dula aduna kay nadaug nga P50 ug ang imong pares aduna usab nadaug nga P50. Daghan ka ug kapili.an pila ang imong ihatag, pero kon gusto nimo nga dili mohatag sama sa tawo B [ihemplo sa tawoB nga anaa sa screen susama usab ang mahitabo], sa pagkahuman sa dula ang imong daug P100 ug ang imong pares wala. Pero, kon imo nga ihatag tanansama sa tawo C, sa maong hitabo, sa pagkahuman sa dula ang imong pares adunay P100 ug ikaw maoy wala. Himundumi nga kon pila ang iyong gibilin mao ang kantidad nga imong daug. Ang kantidad nga imong gihatag ngadto sa imong pares mao usab ang daug sa imong pares. Mga ehimplo lamang kini. Ang matag usa kaninyo mo diseder sa inyong kaugalingon kon pila ang inyong ibilin diha kaninyo ug pila usab ang inyong ihatag ngadto sa imong pares. Importante nga masabtan kon unsa-on pagdula.

[Mga pagbansay gihimo aron pagsiguro nga nasabtan ang pamaagi sa dula.]

Among ipasabot kaninyo unsa.on pagsulat sa tubag diha sa answer sheet. Ang imong posibling kapares usa sa mga nalista diha sa answer sheet nga gihatag diha sulod sa subri; (1) kauban sa inyong purok, (2) kauban sa inyong barangay, (3) kauban sa inyong TSA sa inyong barangay, (4) kauban sa inyong TSA sa managlahi nga barangay, (5) kauban tagilungsod. [Ang han-ay sa pagapili-an gihan-ay sa random aron malikayan ang epekto sa han-ay (i.e., ang kinaiya nga posibling motumaw kon ang pag-usab sa han-ay adunay gisunod). Tungod kay ang TSAs (kahugpungan sa agagamit ug tubig irigasyon) anaa lamang sa lugar nga may irigasyon, kining maong sitwasyon gipangutana lamang sa mga participantes nga sakop sa irigasyon.] Dugang pa niini, sa tulo ka mga sitwasyon, among gitino ang mga pangalan sa imong mga kapares nga nahisulat sa laing answer sheet. Sa maong sitwasyon, ikaw nahibalo sa imong pares apan ang imong pares dili makahibalo kon diin gikan ang daug niya nga kwarta. Kini lilong sa mga participantes.

Una, imong hunahuna-on kon pila ang kantidad nga imong ihatag ngadto sa imong posibling pares nga ana a sa listahan, tsikan ang kahon sa answer sheets. Panaglitan, kon gusto nimo nga mohatag ug P40 ngadto sa imong pares sa unang linya, tsikan ang kahon sa P40 sa maong linya. Ipadayon ang pagtubag sa uban pang posibling pares. Imong hunahuna-on ang matag usa ka sitwasyon. Ayaw pakigsulti sa imong kaubang participantes sa panahon a imong pagtubag. Aron pagproteher sa kaugalingnan sa imong hukom, palihug ug sulod sa imong tubag diha sa subre nga among gihatag kaninyo.

Aduna bay mga pangutana kabahin sa pagpadagan sa dula? Palihug ug tubag sa answer sheets. Pagkahuman pagtubag, isulod ang answer sheet balik sa subre. Ibilin ang tulo ka hulagway sa imong pares ang imong ID diha kanimo. Ato pa kanang gamiton sa uban pang mga dula.

3. Public Goods Game

[Naghimo kami ug tulo ka hugna niining maong dula. Niining maong papel, among gigamit ang resulta sa ulahing duha ka hugna (i.e., public goods game nga adunay silot).]

Kining maong dula susama sa proyekto nga gihimo sa grupo sa mga tawo. Aron pagsabot niining maong dula, hunahuna-a kon unsa-on nimo pagbahin ang imong oras o panahon. Aduna kay oras nga gigahin alang lamang sa kaayuhan sa imong pamilya. Ug aduna usab ikaw panahon nga gigahin alang sa kaayuhan sa katilingban lakip ang imong kaugalingon. Sama sa tubig nga atong gamiton sa atong panimalay, naggahin kita ug oras sa paghakot ug tubig para sa atong kaugalingon ug naggahin usab kita ug oras sa pagpanglimpyo ug magmentinar sa atong tinubdan sa tubig diin nakatabang sa katilingban apil na kanato. Lain usab nga pananglitan mao nga ikaw naggahin ug panahon nga nagpasuhol sa ubang tawo o kaha nagtrabaho sa imong kaugalingon. Kining maong kalihukan nakatabang lamang sa imong kaulingon. Apan naggahin ka usab ug oras sa pagpanglmpyo sa imong palibot nga dili lamang nakaayo kanimo kon di lakip na ang imong kasilinganan. Kining maong dula susama niining maong sitwasyon diin ikaw mohukom sa pagbuhat sa mga butang nga makaayo lamang kanimo o sa pagbuhat sa mga butang nga makaayo kanimo ug sa inyong katilingban.

Sa pagsugod sa dulaadunay ihatag kaninyo nga subre. Kini adunay sulod nga usa ka P50, duha ka P20 ug duha ka P5. Isulat ang inyong ngalan sa ibaw ug tuong bahin copyaha ang numero sa ID nga gihatag uban sa subre a ibabaw ug tuong bahin sa luna nga gigahin.

[Among gigamit ang strategy method niini nga dula ug gipili ang upat ka sitwasyon (nga ipasabot sa unahan). Tulo ka mga kapares wala na gamita. Busa wala na ipasabot kon unsa-on pagsulat ang tulo ka pares.]

Sama sa miaging dula [ang miaging dula nga gipasabot mao ang dula nga gihimo sa grupo sa tag-upat ka tawo], aduna kami guihan-ay nga mga tawo isip imong kauban sa dula. Adunay 3 ka tawo nga imong kauban sa grupo. Silang tanan atua sa pikas kwarto. Ang matag-usa mohukom kon pila ang iyang i-amot sa proyekto sa grupo ug pila ang iyan igahin sa iyang kaugalingon. Ang matag-usa makakuha ug patas nga kaayuhan sa kantidad nga gi-amot alang sa proyekto. Human ang mga miembro migahin ug tipik sa P100 alang sa proyekto, among tapu-on ang tanang kwarta nga inamot. Pagkahuman ug sumada, doblihon ang maong kantidad. Dili ka makahibalo kon pila ang kantidad nga nga gigahin sa matag-usa sa imong mga kauban. Ang matag-usa makadawat sa parehas nga bahin sa naboble nga kantidadbisan ug gamay o dako ang iyang gi-amot.

Aduna kiyay imu-on nga lima ka mga pananglitan. [Unang pananglitan] Ang matag-usa mohukom sa hilom kon pila ang iyang i-amot aron dili mahibalo-an sa uban kon pila ang iyang gi-amot sa proekto ug ikaw usab dili makahibalo sa gi-amot sa uban. Kon ang tanan apil na ikaw mi-amot ug tag P50 alang sa proyekto. Ang katibuk-ang kwartasa pundok mikabat ug P200. Atong doblihon ang maong kantidad mamahimo kining P400. Ang matag-usa kaninyo makadawat ug parehas nga bahin sa P400. Adunay tag P100 ang matag-usa kaninyo. Pagkahuman sa dula ang inyong katibu-an nga daug P100 gikan sa bahin sa proyekto ugng P50 nga imong gibilin diha kanimo. Ang tanan nimong kwarta P150. [Ikaduhang ehimplo] sa pagpadayon sa atong panaglitan, kon ang tanan mohukom nga mo-amot sa tanan nilang kwarta [P100] alang sa proyekto sa grupo. Ang katibu-ang kwarta sa pundok (P110+P100+P100+P100)=P400. Atong doblihon ang maong kantidad mamahimo kining P800. Ang matag-usa makadawat ug parehas nga bahin sa P800. Pagkahuman sa dula aduna kay P200 bahin sa proyekto. Ug tungod kay imo man nga gi-amot ang tanan nga kwarta, ang katibuk-ang daug P200+P0=P200. Ang tanan nga miembro midaug ug P200. [Ikatulong ehimplo] Lain napod nga ehimplo. Kon ang tanan dili mo-amot ang pundok adunay P0+P0+P0+P0=P0. Walay madoble nga kantidad,ug nahuman na ang dula. Walay nadawat ang mga miembro gikan sa proyekto. Pagkahuman sa dula, ang katibk-ang daug mao ra ang kwarta nga diha kanimo. [Ikaupat nga ehimplo] Lain napod nga panaglitan, kon ikaw wala mo-amot alang sa proyekto ug imong mga kauban mi-amot ug tag P50 matag-usa. Ang kwarta sa pundok mikabat ug P0+P50+P50+P50=P150. Atong doblihon ang maong kantidad mahimo kining P300. Ang matag –usa makadawat ug parehas nga bahin gikan sa P300. Ikaw makadawat usab bisan ug wala ka mo-amot. Pagkahuman sa dula ikaw adunay P75 gikan sa grupo ug P100 nga diha kanimo. Ang imong katibu-ang daug P75+P100=P175. Ang imong mga kauban makadawat usab g P75 gikan sa grupo. Ang ilang katibuk-ang daug matag-usa P75+P50=P125. Ang P75 mao ang ilang nadawat sa grupo ug ang P50 mao ang gibilin diha kanila. [Ikalimang ehimplo] Lain napod nga pananglitan.Kon ikaw mi-amot ug P100 walay gibilin diha kanimo.Ug kon ang imong mga kauban wala mo-amot. Ang katibuk-ang kwarta sa grupo P100. Atong doblihon ang maong kantidad mahimong P200. Ang matag-usa makawat ug parehas nga bahin gikan sa P200. Ang matag-usa makadawat ug P50. Pagkahuman sa dula, ang imong daug P50 gikan sa proyekto. Ang imong mga kauban nga wala mi-amot makawat usab ug P50 bisan ug wala sila mo-amot.Ang ilan katibuk-ang daug P150. Kini mga pananglitan lamang, ang matag-usa kaninyo mohukom kon pila ang inyong i-amot gikan sa P100 nga ana-a kanimo. Ang importante nga imong mahibalu-an ang pama-agi sa dula.

[Mga pagbansay gihimo aron pagsiguro nga masabtan ang pama-agi sa dula.]

Karon among ipasabot kon unsaon pagsulat sa answer sheet. Ikaw mohukom kon pila ang imong i-amot sa managlahi nga grupo diin ikaw nahisakop: (1) 4 ka miembro sa purok, (2) 4 nga miembro sa barangay, (3) 4 nga miembro sa TSA, (4) 4 ka tawo nga nagpuyo sa maong lungsod. [Ang han-ya sa sitwasyon gipaagi sa random diha sa answer sheet.aron malikayan ang epekto sa (order). Tungod ka yang TSAs anaa lamang sa lugar nga adunay irigasyon, ang maong sitwasyon gipangutana lamang sa mga participantes nga sakop sa irigasyon.] Palihug hunahuna-a kon pila ang imong i-amot sa imong posibling kagrupo nga anaa sa listahan, chekan ang kahon diin nasulat ang kantidad nga imong i-amot. Pwede ka mo-amot ug P100, P90, P80, P70, P60, P50, P40, P30, P20, P10, ug pwede usab nga dili ka muhatag.

[Human sa mga pangutana ug tubag, amo nang gibatubag ang mga participantes diha sa answer sheet.]

Atong ipadayon ang dula. Ang pamaagi sama lang gihapon sa miaging dula taman sa iyong pag-amot. Apan human sa inyong pag-amot, kon kamo mobayad ug P1 ikaw makakita sa tago sa kantidad nga gi-amot sa imong mga kauban. Unya, ikaw makapadala ug mensahe sa maong kauban nga ikaw wala malipay sa kantidad nga iyang gi-amot. Ang matag mensahe adunay bayad nga P1 ug ikaw mobayad matag mensahe.Kining maong dula himu-on sa makaduha sa parehas nga meimbro.

[Human gihatag ang subre nga may sulod nga answer sheet ug kwarta, among gipasabot unsa-on pagsulat sa ngalan, numero sa ID diha sa answer sheet.]

Ani-ay pipila ka ehimplo. [Unang ehimplo] Human namo makwenta ang abot, ang matag-usa kaninyo makigkita kanamo sa gawas sa lawak. Dinhi, among ipakita ang katibuk-ang amot sa grupo ug ang abot. Niining maong ehimplo, ang katibuk-ang amot P140 ug ang abot P280. Ang maong kantidad bahinon sa parehas sa mga miembro. Ang imong daug P70. Atong idugang ang kantidad nga imong gibilin nga (P50), ang katibuk-ang daug P120. Sa maong pagkita kon ikaw mobayad ug P1 among ipakita ang amot sa matag-usa nimo ka kauban. Sa ehimplo imong nahibalu-an nga ang usa nimo ka kauban mi-amot ug P80, ang usa P10, u gang katapusan wala mo-amot. Ang mga miembro ato lamang ginganlan ug A, B, ug C aro dili nimo mahibalu-an kon si kinsa siya.

Atong ipadayon ang dula sama niini. Kon ikaw wala malipay sa amot sa iong kauban, mobayad ka ug P1 matag mensahe sa walamag-uyon, ang kantidad kuha-on gikan sa imong daug. [Among gigamit ang hulagway nga nagmug-ot isip mensahe ug gipasabot nga mao kadto ang mensahe nga gipadala.] Kini, kon ikaw gusto nga mupadala ug mensahe sa imong kauban kabahin sa ilang gi-amot mobayad ka ug P1; kon duha ang imong padalhan P2; kon tulo P3. Sa atong ehimplo, mibayad ka ug P1 aron Makita ang ilang amot ug P2 sa pagpadala ug mensahe. Ang imong katibuk-ang daug P120-P1-P2= P117.

Aron makapadala ug mensahe, itudlo lamang ang tawo o mga tawo nga padalhan human nimo makita ang kard diin nasulat ang amot ug abot. Dili na kinahanglan nga magsulat ka pa ug mensahe kami na ang mahibalo pagpadala ug mensahe ug pwede ka lang makapadala ug mensahe kon ikaw mobayad alang sa pagtan-aw sa amot sa imong mga kauban. Kon ang miembro makadawat ug mensahe, adunay posibilidad nga iyang tas-an ang iyang amot sa sunod nga dula. Posibli usab nga dili niya usbon ang iyang amot bisan kon nakadawat ug mensahe.

Sa pagsugod sa laing hugna, hatagan kamo namo ug lain nga subre, sulob sa subre, posibli nga makakita ka ug mensahe saw ala pag-uyon nga gipadala nganha kanimo. Dili ka mahibalo kon si kinsa ang nagpadala kanimo ug mensahe. Sa atong ehimplo aduna kay nadawat nga duha ka mensahe, nagpasabot nga duha nimo ka akuban wala makauyon sa imong amot. Kon walay nadawat nga kard nagpasabot nga walay nagpadala ug mensahe. Ang nagpadala u gang gipadalhan lamang ang nasayod nga adunay mensahe, ug walay obligasyon ang nakadawat sa mensahe sa pag-usab sa iyang amot.

[Ikaduhang ehimplo] Niining maong ehimplo, human ka mihatag ug amot (P50), imong nahibalu-an nga ang tanang amot mikabat ug P140 ug ang abot P280, u gang imong bahin P70. Sa panagtagbo sa gawas ikaw gipangutana kon motan-aw ka bas a amot sa uban. Kon ikaw mohukom sa dili pagtan-aw, dinhi nahuman ang dula ug mobalhin na kita sa lain nga hugna. Sa maong hitabo ikaw walay kahigayunan sa pagpadala ug mensahe saw ala pag-uyon. Ang imong daug P120.

[Ikatulong ehimplo] Ang sunod nga ehimplo, ikaw gipahibalo nga ang katibuk-ang amot P330 ug ang abot P660, ug ang imong bahin P165. Kon gusto ka nga motan-aw sat tala-an pinaagi sa pagbayad ug P1, imong mahibalu-an nga ang kadula A mi-amot ug P80, kadula B mi-amot ug P90 ug kadula C mi-amot ug P80, ug ang imo P80. Kon ikaw mohukom sa dili pagpadala ug mensahe saw ala pag-uyon sa imong mga kauban, dinhi nahman ang maong hugna ug mopadayon a lain nga hugna. Sa pagkahuman sa dulaikaw nakadawat ug bahin sa proyekto sa grupo nga P165 ug P20 nga imong gigahin kanimo. Mibayad ka ug P1 sa pagtan-aw sa tala-an, busa ang imong katibuk-ang daug P184.

[Ikaupat nga ehimplo] Ikaw gipahibalo nga ang katibuk-ang amot P160 ug ang abot P320, ug ang imong bahin P80. Kon gusto ka nga motan-aw sat tala-an pinaagi sa pagbayad ug P1, imong mahibalu-an nga ang kadula A mi-amot ug P80, kadula B mi-amot ug P10 ug kadula C mi-amot ug P0, ug ang imo P70. Kon ikaw mohukom sa pagpadala ug mensahe saw ala pag-uyon sa kadula B ug C makagasto ka ug P1+P1=P2. Pagkahuamn sa dula ikaw adunay P80 bahin sa proyekto sa grupo ug P30 nga gigahin kanimo. Mibayad ka ug P1 sa pagtan-aw sa tala-an ug P2 sa pagpadala ug duha ka mensahe, busa ang imong daug P107. Ang mga mensahe isukip sa subre sa sunod nga dula. Ang magdudfula nga makadawat dili makahibako kon kinsa ang nagpadala ug mensahe.

Among gipasabot kon unsaon pagsulat sa answer sheet. Niining maong dulausa ra ka sitwasyon ug imong sulatan ug tubag, ang imong kauban sa pundok naa ra sa imong barangay. Mao kini ang ehimplo nga answer sheet. [Gipakita ang answer sheet nga adunay usa ka sitwasyon.]

[Human sa mga pangutana ug tubag, amo nang gibatubag ang mga participantes diha sa answer sheet.]

Karon amok among pangutan-on kon gusto nimo masayran ang amot sa matag-usa ka miembro ug magpadala ug mensahe sa matag-usa.

[Among gitawag ang mga participantes ug gipangutana kon gusto ba sila makakita sa amot sa ilang kauban ug magpadala ba ug mensahe saw ala pag-uyon.]

Atong ipadayon sa sunod nga hugna.

[Human gihatag ang subre nga may sulod nga answer sheet ug kwarta, among gipasabot unsa-on pagsulat sa ngalan, numero sa ID diha sa answer sheet. Niining higayuna posibling adunay mensahe o mga mensahe nga apil sa subre.]

Ang imong subre posibli nga adunay sulod nga mensahe saw ala pag-uyon nga gipadala kanimo. Hibaw-i nga wala ka masayod kon kinsa sa imong kauban ang nagpadala kanimo. Karon, ikaw mohukom kon pila ang imong i-amot sa proyekto sa pundok.

[Among gibatubag ang mga participantes diha sa answer sheet.]

4. Risk Game

Kining maong dula pakadula-on lamang sa usa ka tawo. Ang hukom sa uban dili maka apektar kanimo. Aduna kay madawat nga P100. Ikaw adunay kahigayunan nga mo pusta gikan sa maong kwarta. Ang imong madaug naga depene sa card nga imong mapili-an. Ikaw mohukom kon asa nga card ang imong pili-on gikan sa onum nga kapili-an, ug imong kuha-on ang card nga napili-an. Ang mga card adunay numero gikan sa usa hangtod sa unom. Kon ikaw mokuha sa unang card, ikaw mapilde sa dula. Kon ang ikaduhang card imong kuha-on mapilde sa ug katunga sa imong pusta. Kon imong pili-on ang ikatulong card tabla ra ka, walay daug walay pilde. Kon imong pili-on ang ikaupat nga card. Ikaw modaug ug 1.5 sa imong pusta. Kon imong pili-on ang ikalima nga card madoble ang imong daug ug kon ang ikaunom nga card ang mapili-an ikaw modaug ug 2.5. Sa ato pa, ang card nga adunay numero usa ug duha dili maayo, ang numero tulo table ra, u gang numero upat, lima ug unom ang mga maayo.

[Human gihatag ang subre nga may sulod nga answer sheet ug kwarta, among gipasabot unsa-on pagsulat sa ngalan, numero sa ID diha sa answer sheet.]

Ani-ay duha ka ehimplo. [Unang ehimplo] Panaglitan mipusta ka ug P20. Adunay nabilin nimo nga P80. Mipili ka ug usa sa unom ka card. Ang imong napili-an numero dos. Nga sa ato pa madoble ang imong kwarta nga gipusta. Mipusta ka ug P20 2xP20 =P40. Busa ang imong tanan nga kwarta human sa dula mao ang P80+P40 aduna kay P120. [Ikaduhang ehimplo] Kon dili ka mopusta.Ang naa kanimo P100 gihapon. Dili na kinahanglan nga mopili ka ug caerd kay wala man ka mopusta. Ang imong tanan nga kwarta P100 gihapon.

[Mga pagbansay gihimo aron pagsiguro nga masabtan ang pama-agi sa dula.]

Among gipasabot unsaon pagsulat sa answer sheet. Pwede ka mopusta ug P100,P90,P80, P70, P60, P50, P40, P30, P20, P10 o dili ka mopusta.

[Human sa mga pangutana ug tubag, amo nang gibatubag ang mga participantes diha sa answer sheet.]

Appendix B. Neighbourhood Characteristics and Regression Results for Robustness Check

Table B1 *Neighbourhood Structure: Characteristics of the 4 Weight Matrices, 6-Nearest Neighbour Model*

	------- Field Plot Neighbours -------			------- Residential Neighbours -------		
	(1) Irrigated Areas	(2) Rainfed Areas	(3) *t*-test for mean difference │(2)-(1)│ [p-value]	(4) Irrigated Areas	(5) Rainfed Areas	(6) *t*-test for mean difference │(5)-(4)│ [p-value]
Weight Code	(a)	(b)		(c)	(d)	
Number of Observations	131	109		132	110	
Total Number of Links	786	654		792	660	
Non-zero Weights (%)	4.58	5.51		4.55	5.45	
Average Number of Neighbours per Person	6	6	0	6	6	0
Average Distance between Neighbours (km)	0.634 (0.316)	0.500 (0.385)	0.134 [0.000]	0.635 (0.357)	0.492 (0.534)	0.143 [0.000]

Table B2 *Neighbourhood Structure: Characteristics of the 4 Weight Matrices, 1/d Distance Decay Neighbourhood Model*

	------- Field Plot Neighbours -------			------- Residential Neighbours -------		
	(1) Irrigated Areas	(2) Rainfed Areas	(3) *t*-test for mean difference │(2)-(1)│ [p-value]	(4) Irrigated Areas	(5) Rainfed Areas	(6) *t*-test for mean difference │(5)-(4)│ [p-value]
Weight Code	(a)	(b)		(c)	(d)	
Number of Observations	131	109		132	110	
Total Number of Links	n/a	n/a		n/a	n/a	
Non-zero Weights (%)	n/a	n/a		n/a	n/a	
Average Number of Neighbours per Person	n/a	n/a		n/a	n/a	
Average Distance between Neighbours (km)	2.532 (0.000)	1.707 (0.000)	0.825 [0.000]	2.460 (0.000)	1.570 (0.000)	0.890 [0.000]

Table B3 *Neighbourhood Structure: Characteristics of the 4 Weight Matrices, Barangay Neighbours Model*

	------- Field Plot Neighbours -------			-------- Residential Neighbours -------		
	(1) Irrigated Areas	(2) Rainfed Areas	(3) *t*-test for mean difference │(2)-(1)│ [p-value]	(4) Irrigated Areas	(5) Rainfed Areas	(6) *t*-test for mean difference │(5)-(4)│ [p-value]
Weight Code	(a)	(b)		(c)	(d)	
Number of Observations	n/a	n/a		129	110	
Total Number of Links	n/a	n/a		1704	2270	
Non-zero Weights (%)	n/a	n/a		10.24	18.76	
Average Number of Neighbours per Person	n/a	n/a		13.209 (5.066)	20.636 (7.284)	7.427 [1.000]
Average Distance between Neighbours (km)	n/a	n/a		1.166 (0.659)	0.962 (0.515)	0.143 [0.564]

Note: Field plot neighbours are not defined in the barangay neighbours model. Two observations are dropped from the irrigated areas because of the absence of neighbours withinthe sample farmers.

Table B4 *Spatial Regressions for the Dictator Game, 6-Nearest Neighbour Model*

Neighbourhood	Field Plot				Residential			
Ecosystem	Irrigated		Rainfed		Irrigated		Rainfed	
Spatial Model	Lag & Cross		Cross		Lag & Cross		Cross	
Weight Code	(a)		(b)		(c)		(d)	
Endogenous Social Effect								
ρ	0.195	†			0.238	†		
	(0.148)				(0.101)			
Neighbours' Characteristics								
Volumetric Pricing Dummy	-24.226	***			-17.041	*		
	(0.008)				(0.059)			
Age	0.180		0.262		-0.034		0.785	†
	(0.647)		(0.610)		(0.928)		(0.136)	
Gender Dummy	7.367		-1.202		6.370		9.359	
	(0.400)		(0.927)		(0.476)		(0.440)	
Years of Schooling	0.329		-2.731		-0.305		1.124	
	(0.854)		(0.156)		(0.881)		(0.518)	
Ln Asset	-0.214		-0.101		-0.441		2.689	
	(0.958)		(0.984)		(0.928)		(0.525)	
Field Area (ha)	20.885	***	1.778		18.450	***	0.789	
	(0.001)		(0.664)		(0.003)		(0.834)	
Household Size	-1.720		-0.295		-0.383		-1.277	
	(0.302)		(0.913)		(0.803)		(0.543)	
Household Female Ratio	-18.869		-37.201		-30.804		-5.128	
	(0.567)		(0.168)		(0.372)		(0.866)	
Own Characteristics								
Volumetric Pricing Dummy	-2.192				-1.116			
	(0.521)				(0.743)			
Age	-0.161		-0.161		-0.140		-0.070	
	(0.284)		(0.390)		(0.354)		(0.678)	
Gender Dummy	3.304		6.081	†	2.439		5.955	†
	(0.412)		(0.132)		(0.544)		(0.109)	
Years of Schooling	0.872		0.342		0.897		0.569	
	(0.164)		(0.615)		(0.180)		(0.374)	
Ln Asset	-0.560		0.981		-0.802		-0.688	
	(0.719)		(0.621)		(0.627)		(0.713)	
Field Area (ha)	-0.810		1.293		-0.999		2.576	*
	(0.764)		(0.462)		(0.719)		(0.085)	
Household Size	-0.180		0.126		-0.381		0.429	
	(0.804)		(0.882)		(0.606)		(0.589)	
Household Female Ratio	27.567	**	-1.961		28.831	**	-4.408	
	(0.020)		(0.854)		(0.014)		(0.661)	
Intercept	16.328		41.595		31.171		-49.609	
	(0.718)		(0.501)		(0.543)		(0.398)	
Sample Size	131		109		132		110	
Fit of the Model								
Multiple R-squared			0.135				0.156	
Adjusted R-squared			0.006				0.032	
F Statistic			1.049				1.257	
			(0.414)				(0.249)	
Wald Statistic	2.200	†			3.374	*		

	(0.138)	(0.066)

Note: The p-values are in parentheses. ***, **, *, and † indicate 1, 5, 10, and 15% statistical significance levels, respectively.

Table B5 *Spatial Regressions for the Dictator Game, 1/d Distance Decay Neighbourhood Model*

Neighbourhood	Field Plot				Residential			
Ecosystem	Irrigated		Rainfed		Irrigated		Rainfed	
Spatial Model	Lag & Cross		Cross		Lag & Cross		Cross	
Weight Code	(a)		(b)		(c)		(d)	
Endogenous Social Effect								
ρ	0.484				0.487	†		
	(0.151)				(0.150)			
Neighbours' Characteristics								
Volumetric Pricing Dummy	-48.841	†			-48.751	†		
	(0.100)				(0.101)			
Age	0.709		1.906		0.682		0.985	†
	(0.606)		(0.610)		(0.618)		(0.136)	
Gender Dummy	-8.251		-8.900		-7.724		1.236	
	(0.745)		(0.927)		(0.760)		(0.440)	
Years of Schooling	1.728		-3.513		1.639		-5.190	
	(0.773)		(0.156)		(0.783)		(0.518)	
Ln Asset	-10.724		6.529		-10.468		5.572	
	(0.468)		(0.984)		(0.476)		(0.525)	
Field Area (ha)	63.798	***	0.927		63.760	***	9.260	
	(0.000)		(0.664)		(0.000)		(0.834)	
Household Size	-4.442		2.166		-4.302		2.437	
	(0.384)		(0.913)		(0.396)		(0.543)	
Household Female Ratio	38.869		-74.952		40.645		-64.961	
	(0.717)		(0.168)		(0.705)		(0.866)	
Own Characteristics								
Volumetric Pricing Dummy	-0.498				-0.520			
	(0.887)				(0.881)			
Age	-0.150		-0.183		-0.152		-0.156	
	(0.339)		(0.390)		(0.332)		(0.678)	
Gender Dummy	2.134		4.666	†	2.131		3.910	†
	(0.613)		(0.132)		(0.606)		(0.109)	
Years of Schooling	0.690		0.119		0.687		0.094	
	(0.289)		(0.615)		(0.288)		(0.374)	
Ln Asset	-0.940		0.372		-0.923		-0.988	
	(0.569)		(0.621)		(0.574)		(0.713)	
Field Area (ha)	0.339		1.177		0.312		2.439	*
	(0.907)		(0.462)		(0.914)		(0.085)	
Household Size	0.009		-0.283		0.007		0.384	
	(0.991)		(0.882)		(0.993)		(0.589)	
Household Female Ratio	27.298	**	-4.997		27.161	**	-1.532	
	(0.024)		(0.854)		(0.023)		(0.661)	
Intercept	93.856		-85.387		0.745		-38.028	
	(0.729)		(0.501)		(0.543)		(0.398)	
Sample Size	131		109		132		110	
Fit of the Model								
Multiple R-squared			0.157				0.177	
Adjusted R-squared			0.031				0.056	
F Statistic			1.246				1.460	†
			(0.256)				(0.142)	
Wald Statistic	3.532	*			3.575	*		

	(0.060)	(0.059)

Note: The p-values are in parentheses. ***, **, *, and † indicate 1, 5, 10, and 15% statistical significance levels, respectively.

Table B6 *Spatial Regressions for the Dictator Game, Barangay Neighbours Model*

Neighbourhood	Residential			
Ecosystem	Irrigated		Rainfed	
Weight Code	(c)		(d)	
Barangay Neighbours' Characteristics				
Volumetric Pricing Dummy	0.345			
	(0.991)			
Age	0.470		1.147	
	(0.399)		(0.502)	
Gender Dummy	-10.871		27.235	
	(0.407)		(0.481)	
Years of Schooling	4.133		2.083	
	(0.173)		(0.527)	
Ln Asset	-7.361		0.158	
	(0.333)		(0.989)	
Field Area (ha)	43.010	***	-2.514	
	(0.000)		(0.825)	
Household Size	-4.180	*	-1.684	
	(0.054)		(0.794)	
Household Female Ratio	79.410		-18.361	
	(0.459)		(0.786)	
Own Characteristics				
Volumetric Pricing Dummy	-2.408			
	(0.593)			
Age	-0.223		-0.071	
	(0.173)		(0.707)	
Gender Dummy	3.055		6.109	
	(0.484)		(0.184)	
Years of Schooling	1.054		0.336	
	(0.166)		(0.589)	
Ln Asset	-1.294		-1.388	
	(0.487)		(0.475)	
Field Area (ha)	-0.034		2.532	†
	(0.991)		(0.102)	
Household Size	0.014		0.690	
	(0.987)		(0.389)	
Household Female Ratio	31.837	**	-2.205	
	(0.046)		(0.828)	
Intercept	10.377		-37.971	
	(0.913)		(0.699)	
Sample Size	129		110	
Fit of the Model				
Multiple R-squared	0.239		0.149	
Adjusted R-squared	0.131		0.024	
F Statistic	2.201	***	1.189	***
	(0.009)		(0.000)	

Note: The p-values are in parentheses. ***, **, *, and † indicate 1, 5, 10, and 15% statistical significance levels, respectively.

Table B7 *Spatial Regressions for the Public Goods Game, Round 1, 6-Nearest Neighbour Model*

Neighbourhood	Field plot				Residential			
Ecosystem	Irrigated		Rainfed		Irrigated		Rainfed	
Spatial Model	Cross		Cross		Cross		Cross	
Weight Code	(a)		(b)		(c)		(d)	
Neighbours' Characteristics								
Volumetric Pricing Ddummy	-6.866				-14.336	†		
	(0.273)				(0.139)			
Age	0.098	†	0.639		-0.452		-0.192	
	(0.131)		(0.320)		(0.273)		(0.787)	
Gender Ddummy	-4.975		22.072		-12.263		35.698	**
	(0.279)		(0.182)		(0.208)		(0.031)	
Years of Schooling	2.298		0.367		3.683	†	1.560	
	(0.926)		(0.883)		(0.106)		(0.523)	
Ln Asset	1.334		-8.768		-2.530		-6.038	
	(0.998)		(0.177)		(0.640)		(0.291)	
Field Area (ha)	8.316		-8.177	†	11.152	*	-0.083	
	(0.190)		(0.112)		(0.089)		(0.987)	
Household Size	-1.062		2.486		2.119		-0.984	
	(0.328)		(0.466)		(0.209)		(0.728)	
Household female ratio	-29.129		-58.276	*	7.321		-27.096	
	(0.751)		(0.086)		(0.847)		(0.509)	
Own Characteristics								
Volumetric Pricing Dummy	-0.797				0.088			
	(0.955)				(0.981)			
Age	-0.425	***	-0.727	***	-0.429	**	-0.716	***
	(0.008)		(0.003)		(0.011)		(0.002)	
Gender Dummy	-5.018		-1.357		-6.305		-1.867	
	(0.305)		(0.787)		(0.154)		(0.709)	
Years of Schooling	0.086		-0.336		0.400		0.200	
	(0.876)		(0.693)		(0.591)		(0.816)	
Ln Asset	1.711		2.176		1.284		1.728	
	(0.201)		(0.381)		(0.478)		(0.494)	
Field Area (ha)	5.090	*	-2.027		5.575	*	-1.665	
	(0.069)		(0.328)		(0.064)		(0.409)	
Household Size	-0.415		-0.818		-0.970		-1.136	
	(0.367)		(0.442)		(0.234)		(0.292)	
Household Female Ratio	14.666	†	-23.425	*	16.356		-19.155	
	(0.125)		(0.086)		(0.206)		(0.166)	
Control								
Risk-Taking Behaviour	0.211	***	0.102		0.196	**	0.122	
	(0.006)		(0.277)		(0.015)		(0.175)	
Intercept	22.797		162.720	**	58.596		149.269	*
	(0.153)		(0.037)		(0.295)		(0.061)	
Sample Size	131		109		132		110	
Fit of the Model								
Multiple R-squared	0.230		0.234		0.264		0.216	
Adjusted R-squared	0.114		0.110		0.154		0.091	
F Statistic	1.982	**	1.890	**	2.404	***	1.729	*
	(0.018)		(0.034)		(0.003)		(0.058)	

Note: The p-values are in parentheses. ***, **, *, and † indicate 1, 5, 10, and 15% statistical significance levels, respectively.

Table B8 *Spatial Regressions for the Public Goods Game, Round 1 1/d Distance Decay Neighbourhood Model*

Neighbourhood	Field plot				Residential			
Ecosystem	Irrigated		Rainfed		Irrigated		Rainfed	
Spatial Model	Cross		Cross		Cross		Cross	
Weight Code	(a)		(b)		(c)		(d)	
Neighbours' Characteristics								
Volumetric Pricing Dummy	-38.147				-39.960			
	(0.241)				(0.221)			
Age	0.161		1.264		0.284		1.105	
	(0.915)		(0.502)		(0.850)		(0.563)	
Gender Dummy	-6.837		-8.330		-6.930		-5.004	
	(0.806)		(0.833)		(0.803)		(0.900)	
Years of Schooling	9.733	†	-5.062		10.310	†	-5.033	
	(0.147)		(0.450)		(0.123)		(0.452)	
Ln Asset	-19.896		-9.437		-21.229		-9.427	
	(0.226)		(0.581)		(0.194)		(0.581)	
Field Area (ha)	39.055	**	-4.703		39.626	**	-3.527	
	(0.033)		(0.778)		(0.030)		(0.834)	
Household Size	-4.461		14.895	***	-4.645		14.899	***
	(0.428)		(0.002)		(0.406)		(0.002)	
Household Female Ratio	-28.228		-14.897		-33.359		-7.854	
	(0.810)		(0.860)		(0.777)		(0.926)	
Own Characteristics								
Volumetric Pricing Dummy	0.190				-0.047			
	(0.961)				(0.990)			
Age	-0.377	**	-0.745	***	-0.367	**	-0.765	***
	(0.031)		(0.002)		(0.035)		(0.002)	
Gender Dummy	-6.057		-5.849		-6.557		-5.797	
	(0.194)		(0.235)		(0.151)		(0.237)	
Years of Schooling	0.319		-0.350		0.351		-0.433	
	(0.662)		(0.668)		(0.627)		(0.593)	
Ln Asset	1.341		2.985		1.284		2.461	
	(0.462)		(0.218)		(0.479)		(0.312)	
Field Area (ha)	5.665	*	-2.124		5.748	*	-1.888	
	(0.074)		(0.288)		(0.068)		(0.343)	
Household Size	-0.460		-0.757		-0.510		-0.683	
	(0.574)		(0.462)		(0.529)		(0.509)	
Household Female Ratio	16.828		-15.428		15.309		-15.625	
	(0.207)		(0.234)		(0.246)		(0.229)	
Control								
Risk-Taking Behaviour	0.235	***	0.190	**	0.237	***	0.189	**
	(0.004)		(0.035)		(0.004)		(0.032)	
Intercept	202.167		78.102		211.918		84.815	
	(0.208)		(0.684)		(0.186)		(0.659)	
Sample Size	131		109		132		110	
Fit of the Model								
Multiple R-squared	0.237		0.268		0.240		0.268	
Adjusted R-squared	0.123		0.150		0.126		0.151	
F Statistic	2.070	**	2.272	***	2.115	**	2.293	***
	(0.013)		(0.009)		(0.011)		(0.008)	

Note: The p-values are in parentheses. ***, **, *, and † indicate 1, 5, 10, and 15% statistical significance levels, respectively.

Table B9 *Spatial Regressions for the Public Goods Ggame, Round 1 Barangay Neighbours Model*

Neighbourhood	Residential			
Ecosystem	Irrigated		Rainfed	
Weight Code	(c)		(d)	
Barangay Neighbours' Characteristics				
Volumetric Pricing Dummy	20.498			
	(0.528)			
Age	0.189		5.050	**
	(0.741)		(0.027)	
Gender Dummy	-22.791	*	49.312	
	(0.092)		(0.331)	
Years of Schooling	1.257		-1.643	
	(0.686)		(0.716)	
Ln Asset	0.455		-3.908	
	(0.954)		(0.793)	
Field Area (ha)	17.102	*	-32.163	**
	(0.083)		(0.033)	
Household Size	-1.945		13.063	†
	(0.382)		(0.126)	
Household Female Ratio	100.876		158.959	*
	(0.365)		(0.076)	
Own Characteristics				
Volumetric Pricing Dummy	0.841			
	(0.856)			
Age	-0.410	**	-0.457	*
	(0.016)		(0.071)	
Gender Dummy	-6.080		-2.227	
	(0.176)		(0.713)	
Years of Schooling	0.531		-0.123	
	(0.507)		(0.880)	
Ln Asset	1.814		0.715	
	(0.343)		(0.779)	
Field Area (ha)	5.693	*	-2.124	
	(0.065)		(0.295)	
Household Size	-0.704		-0.195	
	(0.410)		(0.853)	
Household Female Ratio	30.119	*	-9.280	
	(0.065)		(0.490)	
Control				
Risk-Taking Behaviour	0.197	**	0.088	
	(0.022)		(0.327)	
Intercept	-44.801		-266.381	*
	(0.647)		(0.041)	
Sample Size	129		110	
Fit of the Model				
Multiple R-squared	0.245		0.250	
Adjusted R-squared	0.130		0.130	
F Statistic	2.121	**	2.083	***
	(0.010)		(0.017)	

Note: The p-values are in parentheses. ***, **, *, and † indicate 1, 5, 10, and 15% statistical significance levels, respectively.

Table B10 *Spatial Regressions for the Public Goods Game, Round 2, 6-Nearest Neighbour Model*

Neighbourhood	Field Plot				Residential			
Ecosystem	Irrigated		Rainfed		Irrigated		Rainfed	
Spatial Model	Lag and cross		Cross		Error and cross		Cross	
Weight Code	(a)		(b)		(c)		(d)	
Endogenous Social Effect								
ρ	0.358	***						
	(0.001)							
Correlated social Effect								
λ					0.376	***		
					(0.006)			
Neighbours' Characteristics								
Volumetric Pricing Dummy	-1.908				-9.155			
	(0.786)				(0.287)			
Age	-0.009		-0.963	*	-0.413		-0.283	
	(0.976)		(0.093)		(0.256)		(0.649)	
Gender Dummy	-2.340		18.017		-0.837		32.203	**
	(0.740)		(0.219)		(0.926)		(0.030)	
Years of Schooling	0.728		0.933		0.716		4.596	**
	(0.618)		(0.675)		(0.700)		(0.034)	
Ln Asset	-0.035		1.234		0.558		-4.875	
	(0.992)		(0.830)		(0.902)		(0.326)	
Field Area (ha)	2.780		-0.524		5.011		1.890	
	(0.572)		(0.909)		(0.409)		(0.667)	
Household Size	0.731		-1.162		-0.540		1.222	
	(0.593)		(0.702)		(0.739)		(0.624)	
Household Female Ratio	-15.336		30.637		-32.996		-22.686	
	(0.579)		(0.324)		(0.334)		(0.534)	
Own Characteristics								
Volumetric Pricing Dummy	2.880				3.327			
	(0.293)				(0.225)			
Age	0.163		-0.071		0.161		-0.150	
	(0.184)		(0.750)		(0.205)		(0.489)	
Gender Dummy	1.990		0.091		0.447		1.059	
	(0.534)		(0.983)		(0.890)		(0.807)	
Years of Schooling	0.321		0.219		0.374		0.263	
	(0.532)		(0.771)		(0.503)		(0.726)	
Ln Asset	1.128		0.939		1.192		1.346	
	(0.363)		(0.674)		(0.377)		(0.550)	
Field Area (ha)	-0.117		-2.198		0.763		-2.547	†
	(0.957)		(0.233)		(0.738)		(0.149)	
Household Size	0.591		0.405		0.446		0.000	
	(0.308)		(0.676)		(0.453)		(1.000)	
Household Female Ratio	6.422		-3.527		4.597		-16.797	
	(0.499)		(0.778)		(0.634)		(0.178)	
Controls								
Risk-Taking Behaviour	0.144	**	0.288	***	0.150	***	0.235	***
	(0.014)		(0.001)		(0.010)		(0.003)	
Round 1, Message D	7.480	**	10.778	*	8.020	**	9.978	*

	(0.036)		(0.066)		(0.022)		(0.089)	
Round 1, Free-Riding Index (FRI)	0.229	*	0.040		0.296	**	0.045	
	(0.065)		(0.835)		(0.013)		(0.807)	
Round 1, Message D x FRI	0.453	**	-0.253		0.350	*	-0.220	
	(0.038)		(0.407)		(0.096)		(0.470)	
Round 1, Result	0.844	***	0.561	***	0.850	***	0.527	***
	(0.000)		(0.000)		(0.000)		(0.000)	
Intercept	-54.973	†	11.319		-6.535		30.080	
	(0.148)		(0.872)		(0.905)		(0.675)	
Sample Size	131		109		132		110	
Fit of the Model								
Multiple R-squared			0.472				0.491	
Adjusted R-squared			0.360				0.384	
F Statistic			4.194	***			4.568	***
			(0.000)				(0.000)	
Wald Statistic	14.558	***			10.295	***		
	(0.000)				(0.001)			

Note: The p-values are in parentheses. ***, **, *, and † indicate 1, 5, 10, and 15% statistical significance levels, respectively.

Table B11 *Spatial Regressions for the Public Goods Game, Round 2, 1/d Distance Decay Neighbourhood Model*

Neighbourhood	Field plot				Residential			
Ecosystem	Irrigated		Rainfed		Irrigated		Rainfed	
Spatial Model	Lag & Ccross		Cross		Lag &and Cross		Cross	
Weight Code	(a)		(b)		(c)		(d)	
Endogenous Social Effect								
ρ	0.510	*			0.514	*		
	(0.097)				(0.095)			
Neighbours' Characteristics								
Volumetric Pricing Dummy	22.672				22.174			
	(0.312)				(0.323)			
Age	0.702		-2.551	*	0.726		-2.370	
	(0.505)		(0.132)		(0.489)		(0.649)	
Gender Dummy	-16.220		23.251		-16.076		16.813	**
	(0.399)		(0.502)		(0.400)		(0.030)	
Years of Schooling	-7.617	†	6.710		-7.647	*	7.850	**
	(0.100)		(0.276)		(0.097)		(0.034)	
Ln Asset	30.607	***	7.667		30.733	***	8.600	
	(0.007)		(0.610)		(0.007)		(0.326)	
Field Area (ha)	-11.205		8.716		-11.440		8.429	
	(0.386)		(0.575)		(0.374)		(0.667)	
Household Ssize	1.138		-10.041		1.101		-10.455	
	(0.771)		(0.033)		(0.777)		(0.624)	
Household Female Rratio	-160.619	*	95.522		-164.478	*	99.582	
	(0.061)		(0.203)		(0.055)		(0.534)	
Own Characteristics								
Volumetric Pricing Dummy	2.471				2.575			
	(0.355)				(0.330)			
Age	0.221	*	-0.045		0.220	*	-0.022	
	(0.071)		(0.838)		(0.069)		(0.489)	
Gender Dummy	1.781		0.061		1.933		-0.503	
	(0.578)		(0.989)		(0.538)		(0.807)	
Years of Schooling	0.051		0.591		0.044		0.361	
	(0.918)		(0.417)		(0.930)		(0.726)	
Ln Asset	1.664		1.401		1.671		1.472	
	(0.184)		(0.518)		(0.180)		(0.550)	
Field Area (ha)	-0.712		-1.665		-0.736		-1.266	†
	(0.750)		(0.343)		(0.741)		(0.149)	
Household Size	0.676		0.789		0.694		0.865	
	(0.233)		(0.413)		(0.217)		(1.000)	
Household fFmale Ratio	2.595		-1.729		2.708		-9.049	
	(0.783)		(0.885)		(0.772)		(0.178)	
Controls								
Risk-Taking Behaviour	0.126	**	0.207	***	0.128	**	0.158	***
	(0.029)		(0.011)		(0.026)		(0.003)	
Round 1, Message D	7.370	**	11.469	*	7.365	**	12.808	*
	(0.031)		(0.046)		(0.030)		(0.089)	
Round 1, Free-Riding Index (FRI)	0.289	**	0.019		0.291	**	0.071	
	(0.015)		(0.930)		(0.014)		(0.807)	

Round 1, Message D x FRI	0.309	†	-0.220		0.305		-0.232	
	(0.150)		(0.477)		(0.154)		(0.470)	
Round 1, Result	0.872	***	0.645	***	0.871	***	0.707	***
	(0.000)		(0.000)		(0.000)		(0.000)	
<u>Intercept</u>	-298.363	***	-27.162		-298.792	***	-48.547	
	(0.008)		(0.871)		(0.008)		(0.675)	
<u>Sample Size</u>	131		109		132		110	
<u>Fit of the Model</u>								
Multiple R-squared			0.501				0.495	
Adjusted R-squared			0.394				0.388	
F Statistic			4.695	***			4.633	***
			(0.000)				(0.000)	
Wald Statistic	4.658	*			4.752	**		
	(0.097)				(0.029)			

Note: The p-values are in parentheses. ***, **, *, and † indicate 1, 5, 10, and 15% statistical significance levels, respectively.

Table B12 *Spatial Regressions for the Public Goods Game, Round 2, Barangay Neighbours Model*

Neighbourhood	Residential			
Ecosystem	Irrigated		Rainfed	
Weight Code	(c)		(d)	
Barangay Neighbours' Characteristics				
Volumetric Pricing Dummy	-20.753			
	(0.382)			
Age	1.131	***	0.191	
	(0.008)		(0.929)	
Gender Dummy	12.230		50.382	
	(0.228)		(0.289)	
Years of Schooling	5.878	**	-5.310	
	(0.012)		(0.205)	
Ln Asset	-10.934	*	-4.761	
	(0.068)		(0.729)	
Field Area (ha)	-3.797		6.728	
	(0.605)		(0.633)	
Household Size	2.459	†	9.855	
	(0.133)		(0.217)	
Household Female Ratio	-399.148	***	125.597	†
	(0.000)		(0.136)	
Own Characteristics				
Volumetric Pricing Dummy	1.165			
	(0.731)			
Age	0.242	*	-0.146	
	(0.057)		(0.544)	
Gender Dummy	1.938		0.144	
	(0.556)		(0.979)	
Years of Schooling	0.850		-0.256	
	(0.151)		(0.736)	
Ln Asset	0.090		1.237	
	(0.949)		(0.603)	
Field Area (ha)	0.921		-2.981	†
	(0.691)		(0.115)	
Household Size	0.931	†	0.880	
	(0.140)		(0.372)	
Household Female Ratio	-31.000	**	-5.502	
	(0.013)		(0.666)	
Controls				
Risk-Taking Behaviour	0.116	*	0.275	***
	(0.073)		(0.001)	
Round 1, Message D	7.144	*	10.262	*
	(0.058)		(0.082)	
Round 1, Free-Riding Index (FRI)	0.298	**	-0.005	
	(0.020)		(0.977)	
Round 1, Message D x FRI	0.338	†	-0.133	
	(0.136)		(0.677)	
Round 1, Result	0.893	***	0.536	***
	(0.000)		(0.000)	

Intercept	191.664	**	-84.734	
	(0.012)		(0.486)	
Sample Size	132		110	
Fit of the Model				
Multiple R-squared	0.667		0.452	
Adjusted R-squared	0.602		0.337	
F Statistic	10.200	***	3.911	***
	(0.000)		(0.000)	

Note: The p-values are in parentheses. ***, **, *, and † indicate 1, 5, 10, and 15% statistical significance levels, respectively.