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Motives behind Community Participation

—Evidence from Natural and Field Experiments in a Developing Country—

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Motives behind Community Participation:

Evidence from Natural and Field Experiments in a Developing Country

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Abstract

This study tests alternative hypotheses concerning the motivations behind the participation by rural households in community work. Using unique data from natural and field experiments in southern Sri Lanka, where irrigated fields have been allocated to farmers by government lottery, we compare quantitatively five possible motives behind community participation: public goods investment, general social capital accumulation, production network formation, risk sharing network formation, and pure altruism. Our empirical results show that community participation patterns are consistent with social capital accumulation behavior to form risk sharing networks. Only a few studies have investigated empirically the process of social capital formation, and our analysis fills the gap in the literature. Our findings also suggest the possibility of a poverty trap: facing negative shocks, poor households may have difficulty in finding time for social capital accumulation and risk sharing network formation; this, in turn, may cause them to become more vulnerable and even poorer.

Keywords: Community participation, Social capital, Network formation, Risk sharing

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Introduction

What are the motives behind the participation of rural households in community work? Previous studies on community participation have consistently noted the importance of participation by households in community work (Chambers 1994, Dreze and Sen 2002, Mansuri and Rao 2004, Stiglitz 2002). It has been found that when there is active community participation, there is also improvement in the management of infrastructure (Isham et al. 1995), in the accuracy of safety net targeting (Coady et al. 2004, Conning and Kevane 2002, Rai 2002), and in the quality of schooling (Jimenez and Sawada 1999). Yet there is debate over the effectiveness of community participation. Khwaja (2004), for example, finds that while participation improves outcomes from such non-technical decisions as project selection, it tends to worsens those from more technical ones such as project site selection. Banerjee et al. (2010) find that in India various interventions intended to facilitate community participation in public schools had no impact on teacher effort or on learning outcomes in those schools. Banerjee and Duflo (2006) show that external monitoring technology, rather than community monitoring, is significant for teacher exertion. Olken (2007) also finds that community participation in corruption monitoring has little impact.

On top of these consequences of community participation, there are two reasons why it is indispensable to identify its determinants. First, unless the determinants are known, we cannot derive meaningful policy implications to achieve some desirable level of participation. Second, to understand the costs and benefits of community participation we must closely investigate its structure. Indeed, it is conceivable that the opportunity cost of participation in community work might be too high for villagers, especially when they face unanticipated resource scarcity, caused, for example, by negative income shocks (Kochar, 1999; Morduch, 1995; Rose, 2001). Furthermore, the collective action framework predicts increasing difficulty in achieving active community participation with increases in community size (Holmstrom 1982, Isaac and Walker 1988, Olson 1965).

The goal of this paper is to identify the most important motivations for active community participation. Using unique natural and field experimental data from southern Sri Lanka where irrigated fields have been exogenously allocated to farmers by government lottery, we compare five motives quantitatively: public goods investment, general social capital accumulation, information sharing regarding income generating activities, risk sharing network formation, and pure altruism[1]. First, households participate in community work to enhance local public goods from which they can derive direct benefit even though their own contribution might be less than the socially optimal level. Second, recently arrived members of a community have stronger incentive to participate in the creation of general social capital than do earlier arrivals who are more established.[2] Third, people may participate in community work in order to share information about income generation activities, including the adoption of new technologies (Bandiera and Rasul 2006, Behrman et al. 2002, Conley and Udry 2009, Munshi 2004, Wydick et al. 2009). The close communication through community participation helps people create production networks (Fafchamps 2004, Fafchamps and Minten 2002). Fourth, the benefits of forming a risk sharing network might motivate participation in community activities (Carter and Castillo 2005, Fafchamps and Gubert 2007, Fafchamps and Lund 2003, Karlan 2007, Karlan et al. 2008, Ligon et al. 2002, Murgai et al. 2002). Finally, besides these "selfish" motives, pure altruism also can induce active community participation (Andreoni 1990).

Our empirical results are as follow: we find that facing negative shocks reduces the likelihood of community participation, while diversification of crop varieties across households indicates a greater likelihood of participation. However, even in the face of negative shocks, households newly arrived in their current community are more likely to

[1] In addition to these possible motives, inequity aversion also might spur participation (Fehr and Schmidt 1999). However, due to the unavailability of data to test it, we do not investigate this possibility.

[2] Social capital is defined as the informal forms of institutions and organizations that are based on social relationships, networks, and associations that create shared knowledge, mutual trust, social norms, and unwritten rules (Durlauf and Fafchamps, 2005).

participate than those already established. These findings are consistent with the hypothesis that people participate in community work to accumulate social capital and form risk sharing networks.

We believe that these are new findings in the literature of social capital. Policymakers and development practitioners often encourage social capital accumulation among rural households (Gugerty and Kremer 2000), since it has been recognized as essential to economic development (Grootaert and Van Bastelaer 2002, Putnam et al. 1993, Durlauf and Fafchamps 2005, Ishise and Sawada 2009, Knack and Keefer 1997, Narayan and Pritchett 1999). Although Durlauf and Fafchamps (2005) describe social capital as arising from informal forms of organization based on social networks and associations, empirical quantification of the social capital formation process is scarce (Durlauf 2002, Durlauf and Fafchamps 2005, Miguel et al. 2006, Mobius 2001). Our findings help fill the gap in the literature by showing that community participation patterns are determined by the costs and benefits of social capital accumulation. Our findings furthermore suggest ways in which the design of community development programs can influence levels of community participation and social capital stock. While previous studies find that it is difficult to achieve active participation in heterogeneous and unequal communities (Alesina et al. 1999, Anderson et al. 2008, Baland and Platteau 1999, Bardhan 2000, Ruttan 2008), we find that homogeneity in terms of patterns of income fluctuations also might diminish incentives for households to participate.

The first part of Section 1 describes the study site while the second part discusses our dataset. Section 2 develops the empirical strategies for identifying motivations. In that same section, we test four “selfish” motives. Section 3 employs field experimental data to investigate the altruism motive. Finally, Section 4 concludes the paper.

1. Study Site, Data Description and Identification Tests

Study Site

Our study area is Walawe Left Bank (hereafter, WLB) in Sri Lanka, where the government initiated the Walawe Left Bank Irrigation Upgrading and Extension Project with financial assistance from the Japanese government (JBIC Institute 2007).[3] In this project, an old irrigation system was rehabilitated and a new irrigation system was constructed. Canal construction began in the north of WLB close to Uda Walawe reservoir in 1997 and gradually extended southward. By the end of 2008, almost every household had acquired access to irrigation facilities. The government provided farmers with around 0.2 ha of land for residence, and around 1.0 ha of irrigated paddy field or around 0.8 ha of other food crop field. Originally, before the project started, the farmers applied traditional shifting cultivation to the local variety of banana. The new irrigation system, however, enabled them also to cultivate paddy, sugarcane, onion and the like.

In the irrigated areas, each distribution canal community (D-canal), the smallest unit of branch canal, has a Farmer Organization whose objective is to facilitate such activities as problem solving among farmers, maintenance of irrigation facilities and communal roads, collective procurement of farm inputs, cooperative marketing of products, arrangement of loans to farmers, and religious festival preparations. All settlers are required to register with the organizations and to attend their meetings, although explicit enforcement mechanisms do not exist. Although these are informal organizations, they have direct control over local policy decisions such as the provision of subsidized fertilizers. They are, therefore, considered a type of community driven development program (Mansuri and Rao 2004). Areas without access to irrigation have similar organizations to implement community work.

[3] The population of the area is ethnically and religiously homogenous. Most households are Sinhalese and Buddhist.

Dataset Description and Identification Strategies

Since multi-purpose household surveys were conducted eight times in WLB between 2001 and 2009, we are able to utilize an eight-wave panel dataset. In the final round we also conducted field experiments to collect data on individual preferences, such as altruism.[4] By a multistage stratified random sampling strategy that used a complete list of all households in each stratum, we initially selected 870 representative sample households to survey from the approximately 75,000 residents of the entire WLB area (Sawada, et. al, 2010).[5] Thus the survey gives us data which is representative of the whole WLB area.[6]

We use the panel data from the first to seventh rounds (excluding second round data because its questionnaire design is different from the others). The first to third surveys were implemented in June, August, and October 2001, respectively, to obtain data for the previous October 2000-May 2001 rainy season and the 2001 dry season. The fourth and fifth surveys were conducted in June and October 2002, respectively, to capture information on the 2002 rainy and dry seasons. In 2007, the sixth and the seventh surveys were conducted for 193 households randomly selected from the original 858 households. These surveys provide us with a total of 3815 observations for the analysis reported in this paper: 858 observations from each of the first, third, fourth, and fifth rounds and 193 observations each from the sixth and seventh rounds after dropping three observations due to data problems.

In March 2009 we implemented the eighth survey with field experiments – such as the public goods game, the dictator game and the trust game – with 268 households (187 from the original sample households and 81 new samples) to collect data on social and household preferences directly. In this study, the results of the dictator game are used in combination

[4] The procedure for these experiments is available from the corresponding author upon request.

[5] We divided the entire area into five strata depending on irrigation accessibility—Sevanagala (irrigated), Sevanagala (rainfed), Kiriibbanwewa, Sooriyawewa, and Extension areas. In the 858 households sampled, we included also 146 households from Ridiyagama area on the right bank as an old irrigation area.

[6] In fact, twelve households, or equivalently 1.38% of the targeted respondents, were dropped from our data because they were not available for interviews. We believe any sample selection bias is not serious.

with the panel data.

The study area has two unique characteristics that enable us to identify the determinants of community participation. First, community size of and settlement timing were exogenously determined by the local government of each block office. Blocks are Sri Lankan administration units and each block includes multiple D-canals. Those who had lived in areas of new irrigation construction and were forced to relocate were permitted to declare their preference for a new location within the irrigation system. According to settlers' subjective assessments on land allocation, shown in Table 1, approximately half of the households were allowed to state a preference for land at the plot level.[7] Despite this concession, we may regard the household assignment of forced relocation due to canal construction as exogenously given, since the exact routes of the irrigation canals were not known prior to construction. Thus, even in cases where there was self-selection among those forced to relocate, the characteristics of those households are not seen as systematically different from other households. As to the other households, different distribution rules were applied as summarized at the bottom of Table 1. Intriguingly, the government used lotteries to distribute land for settlement for some 30% of the farmers. Through the lottery, these households received plots for certain crops regardless of their characteristics.

The second distinctive feature of the study area is that the choice of crop varieties was exogenously assigned by the block offices. The irrigation system was carefully designed to provide efficiently the required amount of water for each D-canal. To insure the system's effectiveness, the block offices assigned the crop variety for each field based on the type of canal. Farmers were not allowed to exchange or sell their allocated land, because they did not have ownership rights to the fields. This reduced the possibility that farmers would move to other communities and/or change their crops after they had relocated. Accordingly, we

[7] The data on subjective assessments was collected in the eighth survey conducted in 2009 from the 268 experiment participant households. However, 81 of these households were not originally sampled in the first wave survey and some of the other households did not respond to the questions. Therefore, we report the summary statistics of the remaining 165 households.

consider crop choice to be uncontrollable by the households.

In sum, it seems that changes in the composition of community membership through this resettlement process were exogenous. However, it is an empirical question whether this process effectively achieved exogenous assignment of households within each block, To test the assignment exogeneity hypothesis, we compare observed characteristics of households relative to differences in the processes of land distribution listed in Table 1. Specifically, we perform the mean difference test and the nonparametric Kolmogorov-Smirnov test. In Table 2, results of both tests show that observed household characteristics – such as age and schooling years of head, and household size – do not differ significantly by land distribution process. Furthermore, Aoyagi et al. (2010), using the same dataset, find that observed characteristics are not systematically different between heads and tails of the D-canals and across D-canal communities within the same block.

A related concern is that if crop choices and the size of D-canal communities change endogenously over time, the exogeneity of these characteristics would not hold in the recent survey data. To check this potential problem, we regress the change between the first and seventh surveys in the size of D-canal communities and the proportion of households who cultivate the same crops in the community on the observed household characteristics. We also include exogenous change in access to irrigation as an independent variable, together with block fixed effects. The results are reported in Table 3: the coefficients of household characteristics are not statistically different from zero, suggesting that the exogeneity assumption of community size and crop choice holds. Also, the lack of attrition during the surveys supports a finding that no farmers emigrated to other communities. Overall, the results of these exogeneity tests are consistent with our assumption that households were allocated to communities randomly without regard to their characteristics. Our identification strategy is to use these exogenous variations to identify the causal impacts on community participation of community size, crop choice, and the timing of settlement.

Table 4 summarizes characteristics at the household and community levels relative to participation in community work. First, conditional on the participating households, people spend 0.8 hours a day on average doing community work. Second, there exists a positive and significant correlation between the participation decision and experience with negative shocks, where the binary shock variable is defined as unanticipated negative shock to an individual's income generating activities; these are shocks such as damage from pests, wild animals (elephants, rats, birds, etc.), drought and weeds.[8] Among observations of participation and non participation in community work, 46% and 40%, respectively, faced negative shocks. This may be because households with larger land holdings are more likely both to experience negative shocks and to participate, as noted in the next section.

Finally, household wealth level is correlated with participation patterns. Households with greater land holdings and more education are more likely to participate. People also are more likely to contribute to their community when they have more resources, such as during rainy seasons.

2. Empirical Strategies and Results

This section sets empirical strategies for investigating four motives underlying community participation: investment in public goods, accumulation of general social capital, formation of production networks, and formation of risk sharing networks. After formulating the econometric framework, the estimation results will be presented.

Four "selfish" motives underlying community participation

First, individuals participate in community work if the utility gain from their labor contribution to public goods is greater than the utility gain from additional labor for private

[8] The shock variable is constructed from the question, "Did you have any of the following problems in farming during the last farming season?" with carefully specified answer choices. We chose them because they are major shocks in this area and are less likely to occur endogenously than other types of shocks, such as difficulties in obtaining fertilizers and loans.

goods production. An individual optimizes the level of his/her participation in community work by equating the marginal costs and marginal benefits of participation, so factors affecting costs and benefits will determine the level of community participation.[9] Since the utility gain from participation is likely to be a decreasing function of the number of households in the community, the level of participation will decline as community size increases (Holmstrom 1982, Isaac and Walker 1988, Olson 1965). Hence a testable hypothesis becomes: *ceteris paribus* individuals in a larger community are less likely to participate in community work than individuals in a smaller community.

Second, if social capital is characterized by decreasing marginal productivity in production activities, households with lower initial social capital will have a larger incentive to invest in social capital. Since we do not have data on initial social capital stock unfortunately, we approximate it using time elapsed since households moved to their current canal community; a new settler will find it more beneficial to participate in community work, because he/she has more to gain from community networks. Thus, the general social capital accumulation motive implies that newer settlers tend to participate more than older settlers in community work.

Third, it may be important for rural households to accumulate social capital to join production networks. A large number of existing studies show that rural households share information about their production activities with members of their community (Behrman et al. 2002, Bandiera and Rasul 2006, Conley and Udry 2009, Fafchamps 2004, Fafchamps and Minten 2002, Munshi 2004). Close communication through community participation reduces social distance among individuals, making it easier for them to share information, to enforce contracts, and to reduce transaction costs in production activities.

Fourth, social capital formation is also important for establishing risk sharing networks (Murgai et al. 2002). This is done by building close social relationships through which

[9] Yet, the level of individual contribution to public goods could be less than the socially optimal level.

individuals create social collateral (Karlan et al. 2008) and thus exchange idiosyncratic shocks (Townsend, 1994).

To differentiate the third and the fourth motivations empirically, we focus on the nature of heterogeneities in production activities. If the motive underlying community work is the formation of production networks for sharing information regarding income generation activities, people can be expected to participate more when other community members cultivate the same crop. On the other hand, those who want to form risk sharing networks might prefer the reverse situation: if others cultivate the same crops, their incomes will be correlated, thus limiting space in the community for a risk sharing network. If the motive is to form a risk sharing network, therefore, households will participate more when other people cultivate other crops.

Estimation strategy

Our econometric strategy is to utilize a natural experimental situation, i.e., a "serendipitous" situation where households are unintentionally and randomly assigned to a treatment and control group (DiNardo, 2008). We believe we can then identify the causal impact on community participation of community size, settlement timing, and crop choice. These exogenous characteristics may, however, affect participation patterns through various channels (Banerjee et al. 2008). For instance, community size and crop heterogeneity can affect the process of market and institutional development and the price dynamics of inputs and outputs. Furthermore, households who have lived longer in the community might have more experience with agriculture.

To further identify important channels of causality, we employ the exogenous shock variable, S_{ivt}, which takes the value of one if the household i in the D-canal community v faces unanticipated negative shocks in its income generation activities, such as damage from pests, wild animals, drought and weeds, during period t. Negative shocks decrease the consumption

levels of individuals and increase the marginal utility of private goods consumption in the current period; this in turn increases the opportunity costs of investment in public goods and future social capital/network formation. Indeed, it is known that households in poor countries often cope with negative shocks by increasing their labor to earn more income (Jacoby and Skoufias 1997, Kochar 1999; 2004, Morduch 1995). Then, as a part of independent variables for the community participation equation, we include this shock variable interacted with the three exogenous characteristics to identify motives. After these considerations, we set and estimate the following equation using the linear probability model:

$$P_{ivt} = S_{ivt}\,\beta_1 + (S_{ivt} \times SIZE_v)\,\beta_2 + (S_{ivt} \times YEAR_{iv})\,\beta_3 + (S_{ivt} \times CROP_{iv})\,\beta_4 \qquad (1)$$
$$+ X_{ivt}\beta_5 + Z_{iv} + W_{vt} + \varepsilon_{ivt}\,.$$

where P_{ivt} is a binary participation variable in community work which takes the value of one if the household i in the community v participates in community work at least once during the period t and zero otherwise; $SIZE_v$ denotes the number of households in the community;[10] $YEAR_{iv}$ represents years since the household moved to the community v; $CROP_{iv}$ is the proportion of households who cultivate the same crops as household i in the community;[11] X_{ivt} is a set of household characteristics such as land assets, age and education of household head, and household size; Z_{iv} shows household fixed effects; W_{vt} period specific D-canal community fixed effects; and, finally, ε_{ivt} is a residual term.

The reason for using the interaction term is as follows: while negative idiosyncratic shocks increase the cost of public goods investment and social capital/network formation of individuals, they do not affect the process of market and institutional development. Therefore, if the impact of the exogenous characteristics varies depending on the experience of negative

[10] The number of households in each community is reported in the household survey. To mitigate the bias arising from measurement errors, we use the mean level in each community for all the survey rounds.

[11] Banerjee et al. (2008) introduce various useful indicators to represent the social heterogeneity of a community. However, we do not use them because households in the area cultivate multiple crops and the indicators are not applicable.

shocks, it will capture the change in net gain from the investment in public goods and social capital/networks. These asymmetric impacts of shocks help identify the motives behind community participation. First, if the motivation is public goods investment, the likelihood of participation will decline with the incidence of negative shocks and the increase in community size. Therefore, the estimated coefficient β_2 will be negative. Second, if general social capital accumulation is a major motive behind community participation, the coefficient β_3 is expected to be negative: new comers will participate even in the face of hardship because of the high return. Third, as to participation motivated by production network formation, in a situation where many people in the same community cultivate the same crops, individuals will be able to obtain more useful information regarding production activities. Therefore, the production network hypothesis implies that β_4 is positive. On the other hand, a negative β_4 coefficient is consistent with the risk sharing hypothesis, because the more people cultivate the same crop, the higher their income correlation will be, mitigating the participation incentive to share risk. This is the case when people are more likely to face covariate shocks that they cannot cope with using risk sharing arrangements within the community.

To control for unobserved channels of community participation, apart from those mentioned above, we include period-specific community fixed effects W_{vt}. Note that these fixed effects will also capture community level time variant characteristics such as covariate shocks and neighborhood effects. This specification, therefore, captures only the impact of idiosyncratic changes in opportunity costs. It is important to control for the covariate changes in opportunity costs and benefits of participation because they affect participation decisions through, for instance, market mechanisms, causing the identification problem.

There might be concern that negative shocks, such as damage from weeds, could be endogenous since they are determined by such things as respondents' subjective perceptions of shocks and their experiences with agriculture. We address this issue by controlling for household preference shifters and for household fixed effects. We also estimate using the

same estimation equation but with a different definition of negative shock, one which does not include damage from weeds. The results, which are unreported here, do not change qualitatively.

Estimation Results

Table 5 shows the estimation results. All estimation specifications include household fixed effects. All specifications also employ cluster adjusted standard errors at the canal community level. This addresses the correlation of residuals across households in the community over time. Panel A and Panel B report the results of specifications without and with period specific community fixed effects, respectively.

The first column of Panel B shows that negative shocks decrease the probability of community participation by 4.3 percentage points. Negative shocks raise the marginal utility gain from labor and reduce the likelihood of participation, possibly because the opportunity costs are too high. Negative shocks reduce the income level and this requires households to spend more time in income generating activities. To confirm this scenario, we estimate the impact of shocks on the time allocation for production activities. Table 6 reports a consistent result: in the face of negative shocks, people increase their time allocation for production activities by 0.24 to 0.26 hours a day per adult equivalent scale.

The second columns in Table 5 show that the coefficient of the cross term with community size is positive and significant. When faced with negative shocks, households in communities with large populations tend to participate more. This finding is counter to the prediction of public goods investment framework. Successfully managed communities could potentially assure participation regardless of community size (Ostrom 1990), but this does not explain the positive impact of community size. Therefore, we reject the possibility of public goods investment as a major motive for participation.[12]

[12] Using the same dataset, Kasahara et al. (2010) finds a negative rather than positive group size effect

The third columns show that when facing negative shocks, those who moved to the community one year later have an increased probability of participation of 0.2 to 0.3 percentage points, which is consistent with the general social capital accumulation motivation. Intriguingly, it appears that negative shocks do not affect participation behavior for households who recently moved to the community: the coefficient β_1 is statistically insignificant.

Finally, results in the fourth columns in both panels indicate that when other individuals within the same community cultivate other crops, an individual will participate more in community work even in the face of negative shocks. While information sharing regarding production activities is important, especially where a new technology or new crop variety has been introduced, these results show that formation of a risk sharing network is a more important motivator than production network formation.

As can be seen from the fifth columns, these findings are robust to the specification that control for these factors altogether. In sum, our estimation results reject the possibility of public goods investment and production network formation motivations and support the risk sharing network hypothesis together with motivations to accumulate general social capital.

As for the other determinants of participation, the coefficients of landholdings and education level are positive and statistically significant, indicating that wealthy households are more likely to participate.[13] Finally and not surprisingly, large households are more likely to contribute, presumably reflecting the time opportunity costs of participation.

3. An Alternative Hypothesis: Altruistic Preference

Thus far we have investigated only "selfish" motives, but recent studies have shown evidence that individuals' utilities are altruistically linked (Andreoni 1990, Andreoni and

on monetary contribution to each community. Our interpretation of these asymmetric results is that while the activity participation decision is induced by a social capital accumulation motive, the monetary contribution decision is explained directly by the standard public goods investment model.

[13] Isham and Kahkonen (2002) also examine the determinants of community participation in the context of rural Sri Lanka, but they find that the impact of asset holdings is unstable and statistically insignificant.

Miller 2002), possibly causing people to participate in their communities. To examine this possibility, in this section we investigate the hypothesis that altruism is a motive behind participation in community work. Some studies use non-experimental approaches to investigate altruism among community members (Cox et al. 1998, Cox et al. 2004, Cox and Fafchamps 2008, Kazianga 2006), while others employ experimental approaches that directly measure the level of altruism at the household level (Cardenas and Carpenter 2008). We follow the latter approach, combining the basic data used so far with unique data from field experiments.

In our eighth survey we conducted a series of field experiments such as the public goods game, the dictator game, the trust game, and the time and risk preference game. These field experiments include 256 households – 187 from the original 858 sample households and 69 from new sample households. The present study uses the results of the dictator game.[14] We estimate the following equation:

$$P_{ivt} = S_{ivt}\,\gamma_1 + (S_{ivt} \times ALT_{iv})\,\gamma_2 + X_{ivt}\,\gamma_3 + Z_{iv} + W_{vt} + \varepsilon_{ivt}\,. \qquad (2)$$

where, ALT_{iv} denotes the proportion of cash that respondents gave to their partners out of the dictator game endowment. If altruism is a major motive, we would expect γ_2 to be positive. In our experimental design, we measure the level of altruism for three anonymous groups: individuals of the same D-canal community, individuals of a different D-canal community in the same unit, and individuals of a different unit.[15]

Panel B of Table 4 presents the summary statistics of the dictator game. Table 7 reports the empirical results.[16] Table 7 does not show robust evidence of altruism as a cause

[14] A detailed description of experiment implementation is available from the corresponding author upon request.
[15] Each unit includes multiple D-canal communities.
[16] This estimation has only 1075 observations because we conducted the field experiment only for the subsample of respondents.

of household participation: the coefficients of interaction term are statistically insignificant or only marginally significant, although the signs are consistent with the prediction.

One might have concern regarding these results given that the experiment was conducted in the final survey. The level of altruism might simultaneously be affected by individuals' behaviors, such as participation in community work, causing biased estimation results. The level of altruism toward anonymous individuals, however, could be considered as exogenously determined and time invariant (Ligon and Schechter 2008). Altruism toward individuals in a different unit could be an approximation for altruism toward anonymous individuals, but still it does not explain participation patterns. Also, this type of potential bias, if any, does not qualitatively affect our finding that rejects the possibility of altruism. It is plausible that the frequent participation creates social capital and raises the level of altruism with their community members. This reverse causality from participation to the altruism would cause a positive correlation. Therefore, the estimated coefficient γ_2 could be considered the upper bound of the impact on participation.

One might be concerned still, even if the reverse causality is addressed, because there are various unobservable factors correlated with both participation decision and altruism level. For instance, rich and educated household might be more likely both to be altruistic and to participate. Similarly, individuals' histories, such as parents' characteristics, might be correlated. We control for these hard-to-observe factors using the household fixed effects.

Finally, altruism might affect the participation decision nonlinearly. This specification error causes biased estimation. To address this issue, we employ an alternative specification as follows:

$$P_{ivt} = S_{ivt}\,\delta_1 + (S_{ivt} \times MEDALT_{iv})\,\delta_2 + (S_{ivt} \times HIGHALT_{iv})\,\delta_3 \qquad (3)$$
$$+ X_{ivt}\delta_4 + Z_{iv} + W_{vt} + \varepsilon_{ivt}\,.$$

where, $MEDALT_{iv}$ takes unity if the level of altruism is medium (10 to 20% of cash transfer in the dictator game), while $HIGHALT_{iv}$ takes unity if the level is higher. In this specification, the impact of negative shocks for those with low level altruism (0% of cash transfer) is represented by δ_1, the impact for those with medium level altruism is $\delta_1 + \delta_2$, and finally the impact for those with high level altruism is $\delta_1 + \delta_3$. Table 8 shows the estimation result. We do not find robust evidence that altruism causes individuals to participate. The impact of altruism is unstable across levels.

Conclusion

This study employed the natural experimental situation of southern Sri Lanka where we can nicely identify the major motives for community participation. Our empirical results show that households participate to accumulate general social capital and particularly to form risk sharing networks. Where the crop choice is diversified, return to risk sharing arrangements is high and people are more likely to contribute to their community despite the incidence of increases in opportunity costs.

Diversified crop choice across households could increase participation through at least two routes. First, crop diversification increases the benefits from participation by improving the availability of risk sharing arrangements as shown in this paper. Second, the formation of risk sharing networks, in turn, decreases the opportunity costs of community participation caused by negative shocks. This, however, implies the possibility of a poverty trap. Poor households are less likely to spend time for social capital and risk sharing network formation, especially when faced with unanticipated negative shocks. This causes them to become more vulnerable to risks, forcing them to become even poorer.

Appendix A1: Robustness (Unbalanced Panel)

As described in Section 1, our panel dataset is unbalanced. While the first five surveys include 858 households, the sixth and the seventh surveys were conducted for only a randomly selected 193 of them. Therefore, we also examine a series of estimations without using the sixth and seventh waves. The estimation results, which still are robust, are reported in Table A1. Again, our findings support the general social capital formation and risk-sharing motives for participation and reject other hypotheses.

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Table 1: Subjective Assessments on Implementation of Land Allocation Using Lotteries

	Residences	Irrigated Plots
Any chances to claim your preferences?	Obs. = 165	Obs. = 150
Not at all	29.70%	31.54%
Block level	10.91%	12.75%
Unit-canal level	2.42%	2.69%
D-canal level	1.21%	2.01%
Plot level	55.76%	51.01%
Total	100.00%	100.00%
Land allocation process	Obs. = 162	Obs. = 148
Acquired the preferred area without process	51.23%	45.95%
Lottery within or outside the claimed area	24.08%	29.06%
First come, first served basis	8.02%	9.46%
Negotiation among the resettlers	3.70%	4.05%
No formal permission regarding the land use	8.64%	6.76%
Others	4.32%	4.73%
Total	100.00%	100.00%

Note: This data was collected in the eighth survey conducted in 2009 from 268 experiment participant households. However of these, 81 households were not originally sampled in the first wave survey and some other households did not respond to the questions. In the end, we report the summary statistics of the remaining 165 households.

Table 2: Household Characteristics Relative to the Distribution Rule of Houses and Irrigated Fields

	Did you have any chances to claim the preference at the plot level?				Did you draw a lottery?			
	No	Yes	Mean Diff. #	K-S test #	No	Yes	Mean Diff. #	K-S test #
Residences								
Age of head	45.22 (10.91)	45.36 (10.43)	0.93	0.99	44.99 (9.49)	45.78 (11.33)	0.63	0.39
Educated years of head	5.08 (3.35)	5.65 (3.28)	0.27	0.57	5.13 (3.07)	5.58 (3.49)	0.39	0.67
Household size	5.12 (1.69)	5.20 (1.76)	0.79	1.00	5.20 (1.68)	5.16 (1.78)	0.89	0.88
Obs.	73	92			70	92		
Irrigated Plots								
Age of head	45.09 (11.21)	46.95 (9.54)	0.28	0.69	45.15 (9.79)	46.83 (10.97)	0.33	0.50
Educated years of head	5.26 (3.46)	5.43 (3.22)	0.75	0.91	5.18 (3.14)	5.50 (3.50)	0.55	0.92
Household size	5.08 (1.58)	5.34 (1.94)	0.37	0.89	5.07 (1.56)	5.35 (1.95)	0.34	0.39
Obs.	74	76			68	80		

Note: # P-values are reported.

Table 3: Determinants of Changes in Community Size and Crop Choice over Time

Dependent Variables:	Change in the size of D-canal community	Change in the proportion of households cultivating the same crops in the D-canal community
Age of head	66.567	-3.643
	(137.655)	(2.566)
Educated years of head	0.358	-0.012
	(0.542)	(0.011)
Household size	-0.516	0.012
	(0.635)	(0.019)
Dummy for access to irrigation as of the first wave	-3.371	-0.015
	(4.091)	(0.098)
Dummy if obtain access to irrigation between the first and seventh waves	-0.412	-0.055
	(1.885)	(0.091)
Block fixed effects	Yes	Yes
R^2	0.020	0.047
Mean of Dep. Var.	0.519	0.001
Median of Dep. Var.	0.000	0.000
H_0: coefficients of age, education, and household size are jointly zero (P-value)	0.782	0.313
H_0: all coefficients including block fixed effects are jointly zero (P-value)	0.378	0.183
Obs.	191	193

Cluster-adjusted robust standard errors are reported.
*** 1% significant, ** 5% significant, * 10% significant, respectively

Table 4: Household Characteristics Relative to Participation in Community Work

	Participated	Not Participated	Mean Difference
Panel A			
Hours a day contributing to community work	0.80 (1.22)	- -	
Negative shocks	0.46 (0.50)	0.40 (0.49)	***
Irrigated land holdings (ha)	1.50 (1.28)	1.26 (1.35)	***
Non-irrigated land holdings (ha)	1.22 (1.49)	1.09 (1.38)	**
Age of head	50.0 (12.4)	49.2 (14.2)	*
Educated years of head	5.90 (3.40)	5.64 (3.36)	**
Household size	5.10 (1.80)	4.84 (2.08)	***
1 if rainy season	0.51 (0.50)	0.48 (0.50)	**
Community size (households)	116.61 (34.95)	112.71 (32.12)	***
Years since settlement	27.87 (12.57)	27.23 (14.24)	
Proportion cultivating the same crops in the community	0.70 (0.53)	0.59 (0.53)	***
Obs.	2477	1341	
Panel B			
Altruism for those in the same community[#]	0.28 (0.21)	0.29 (0.20)	
Altruism for those in a different community in the same unit[#]	0.20 (0.19)	0.21 (0.19)	
Altruism for those in a different unit[#]	0.15 (0.18)	0.18 (0.19)	**
Obs.	817	261	

Standard deviations are reported.

#: the proportion of cash that respondents gave to their partners out of the endowment of the dictator game.

*** 1% significant, ** 5% significant, * 10% significant, respectively

Table 5: Motives for Community Work: Dependent Variable: Dummy if participate in community work

	Panel A Controlling for only period fixed effects					Panel B Controlling for period specific canal fixed effects				
	[1]	[2]	[3]	[4]	[5]	[1]	[2]	[3]	[4]	[5]
Shocks	-0.024	-0.137**	0.053	0.031	-0.001	-0.043**	-0.159**	0.022	0.016	-0.043
	(0.021)	(0.064)	(0.041)	(0.030)	(0.064)	(0.020)	(0.060)	(0.037)	(0.033)	(0.062)
Shocks*Community size		0.001*			0.0009**		0.0010**			0.0011***
		(0.001)			(0.0004)		(0.0005)			(0.0003)
Shocks*Years since settlement			-0.003**		-0.003**			-0.002**		-0.002**
			(0.001)		(0.001)			(0.001)		(0.001)
Shocks*Crop share				-0.074***	-0.068***				-0.074**	-0.074**
				(0.026)	(0.025)				(0.030)	(0.029)
Irrigated land	0.023**	0.023**	0.022**	0.023**	0.022**	0.025***	0.025***	0.024**	0.025***	0.024**
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Unirrigated land	0.022**	0.023**	0.022**	0.022**	0.023**	0.021*	0.021*	0.020*	0.021*	0.020*
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
1 if 2nd quartile of age of head (41 to 48)	-0.024	-0.024	-0.023	-0.019	-0.017	-0.009	-0.007	-0.007	-0.004	0.000
	(0.062)	(0.063)	(0.062)	(0.062)	(0.064)	(0.060)	(0.062)	(0.060)	(0.061)	(0.062)
1 if 3rd quartile of age of head (49 to 57)	0.009	0.008	0.012	0.019	0.020	0.024	0.025	0.028	0.032	0.036
	(0.086)	(0.087)	(0.087)	(0.087)	(0.088)	(0.087)	(0.088)	(0.088)	(0.087)	(0.088)
1 if 4th quartile of age of head (57 or over)	0.036	0.033	0.040	0.046	0.046	0.011	0.008	0.015	0.017	0.018
	(0.088)	(0.089)	(0.089)	(0.090)	(0.091)	(0.090)	(0.091)	(0.090)	(0.091)	(0.092)
Head's years of education	0.027***	0.027***	0.027***	0.028***	0.028***	0.023**	0.023**	0.023**	0.023**	0.023**
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Household size	0.025**	0.025**	0.026**	0.025**	0.026**	0.028**	0.028**	0.028**	0.028**	0.028**
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
R^2	0.073	0.075	0.075	0.075	0.078	0.107	0.108	0.108	0.109	0.110
Obs.	3815	3815	3815	3815	3815	3815	3815	3815	3815	3815

All specifications include the household fixed effects. Cluster-adjusted robust standard errors are reported. *** 1% significant, ** 5% significant, * 10% significant, respectively

Table 6: Negative Shocks and Opportunity Costs of Participation

Dependent Variable: Time Allocation (hrs/day) for Income Earning Activities

	Controlling for only period fixed effects	Controlling for period specific canal fixed effects
Shocks	0.264***	0.239***
	(0.056)	(0.059)
Irrigated land	0.062*	0.067
	(0.032)	(0.048)
Unirrigated land	0.088***	0.107***
	(0.028)	(0.027)
1 if 2nd quartile of age of head (41 to 48)	-0.023	0.006
	(0.140)	(0.151)
1 if 3rd quartile of age of head (49 to 57)	0.178	0.196
	(0.186)	(0.209)
1 if 4th quartile of age of head (57 or over)	0.283	0.231
	(0.295)	(0.324)
Head's years of education	0.012	0.040
	(0.026)	(0.025)
Household size	-0.088**	-0.112***
	(0.043)	(0.041)
R^2	0.169	0.233
Obs.	3755	3755

The dependent variable is adjusted with the adult equivalent scale. All specifications include the household fixed effects. Cluster-adjusted robust standard errors are reported. *** 1% significant, ** 5% significant, * 10% significant, respectively

Table 7: Altruistic Preference

Dependent Variable: Dummy if participate in community work

	Controlling for only period fixed effects			Controlling for period specific canal fixed effects		
	[1]	[2]	[3]	[1]	[2]	[3]
Shocks	-0.026	-0.032	-0.035	-0.025	-0.050	-0.049
	(0.059)	(0.042)	(0.042)	(0.078)	(0.062)	(0.051)
Shocks*Altruism for those in the same D-canal	0.059			0.056		
	(0.129)			(0.173)		
Shocks* Altruism for those in a different D-canal in the same unit		0.113			0.211	
		(0.181)			(0.216)	
Shocks* Altruism for those in a different unit			0.170			0.255*
			(0.141)			(0.144)
Irrigated land	0.002	0.002	0.002	0.006	0.006	0.006
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
Unirrigated land	-0.004	-0.004	-0.004	-0.010	-0.011	-0.010
	(0.015)	(0.015)	(0.015)	(0.021)	(0.021)	(0.021)
1 if 2nd quartile of age of head (41 to 48)	-0.083	-0.083	-0.085	-0.036	-0.036	-0.039
	(0.081)	(0.083)	(0.082)	(0.073)	(0.074)	(0.075)
1 if 3rd quartile of age of head (49 to 57)	-0.036	-0.036	-0.038	0.018	0.018	0.014
	(0.109)	(0.110)	(0.111)	(0.111)	(0.110)	(0.114)
1 if 4th quartile of age of head (57 or over)	-0.053	-0.054	-0.053	-0.010	-0.010	-0.009
	(0.115)	(0.117)	(0.118)	(0.120)	(0.123)	(0.124)
Head's years of education	0.017	0.017	0.016	0.014	0.013	0.012
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.013)
Household size	0.018	0.018	0.018	0.026	0.025	0.026
	(0.014)	(0.014)	(0.014)	(0.016)	(0.016)	(0.016)
R^2	0.133	0.133	0.133	0.246	0.248	0.248
Obs.	1075	1075	1075	1075	1075	1075

All specifications include the household fixed effects. Cluster-adjusted robust standard errors are reported. *** 1% significant, ** 5% significant, * 10% significant, respectively

Table 8: Nonlinearity in Altruism and Participation

	Controlling for only period fixed effects			Controlling for period specific canal fixed effects		
	[1]	[2]	[3]	[1]	[2]	[3]
Shocks	-0.112**	-0.030	-0.023	-0.111	-0.056	-0.047
	(0.053)	(0.077)	(0.062)	(0.081)	(0.095)	(0.071)
Shocks*Medium altruism for those in the same D-canal	0.125***			0.123**		
	(0.038)			(0.052)		
Shocks*High altruism for those in the same D-canal	0.100*			0.104		
	(0.056)			(0.086)		
Shocks* Medium altruism for those in a different community in the same unit		0.018			0.037	
		(0.077)			(0.092)	
Shocks* High altruism for those in a different community in the same unit		0.037			0.096	
		(0.065)			(0.089)	
Shocks*Medium altruism for those in a different unit			0.001			0.029
			(0.052)			(0.060)
Shocks* High altruism for those in a different unit			0.072			0.121*
			(0.059)			(0.063)
Irrigated land	0.002	0.003	0.002	0.006	0.006	0.006
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
Unirrigated land	-0.004	-0.004	-0.004	-0.010	-0.010	-0.010
	(0.015)	(0.015)	(0.015)	(0.020)	(0.021)	(0.021)
1 if 2nd quartile of age of head (41 to 48)	-0.079	-0.082	-0.083	-0.032	-0.032	-0.034
	(0.084)	(0.083)	(0.083)	(0.075)	(0.073)	(0.075)
1 if 3rd quartile of age of head (49 to 57)	-0.035	-0.035	-0.036	0.019	0.023	0.019
	(0.112)	(0.110)	(0.113)	(0.113)	(0.109)	(0.115)
1 if 4th quartile of age of head (57 or over)	-0.053	-0.051	-0.053	-0.012	-0.004	-0.004
	(0.116)	(0.117)	(0.120)	(0.121)	(0.121)	(0.125)
Head's years of education	0.017	0.017	0.016	0.013	0.013	0.012
	(0.012)	(0.012)	(0.012)	(0.012)	(0.013)	(0.012)
Household size	0.019	0.018	0.018	0.026	0.025	0.025
	(0.014)	(0.014)	(0.014)	(0.017)	(0.016)	(0.017)
R^2	0.134	0.133	0.133	0.247	0.247	0.248
Obs.	1075	1075	1075	1075	1075	1075

All specifications include the household fixed effects. Cluster-adjusted robust standard errors are reported. *** 1% significant, ** 5% significant, * 10% significant, respectively

Table A1: Unbalanced Panel
Dependent Variable: Dummy if participate in community work

	Controlling for only period fixed effects	Controlling for period specific canal fixed effects
Shocks	-0.038	-0.073
	(0.067)	(0.058)
Shocks*Community size	0.0012**	0.0013***
	(0.0005)	(0.0004)
Shocks*Years since	-0.002**	-0.002**
settlement	(0.001)	(0.001)
Shocks*Crop share	-0.071**	-0.076**
	(0.028)	(0.033)
Irrigated land	0.026***	0.029***
	(0.008)	(0.008)
Unirrigated land	0.024**	0.024**
	(0.011)	(0.011)
1 if 2^{nd} quartile of age of	0.082	0.086
head (41 to 48)	(0.070)	(0.072)
1 if 3^{rd} quartile of age of	0.052	0.060
head (49 to 57)	(0.089)	(0.091)
1 if 4^{th} quartile of age of	0.098	0.057
head (57 or over)	(0.106)	(0.105)
Head's years of education	0.037**	0.035**
	(0.014)	(0.014)
Household size	0.033**	0.033**
	(0.015)	(0.016)
R^2	0.065	0.090
Obs.	3432	3432

All specifications include the household fixed effects. Cluster-adjusted robust standard errors are reported. *** 1% significant, ** 5% significant, * 10% significant, respectively

Abstract (in Japanese)

要約

途上国農村の開発案件を効率的に運営する上で、住民の積極的な参加が重要であるということが多くの既存研究で指摘されてきた。しかし、住民参加がどのようなインセンティブに基づいて行われるかを厳密に分析した研究は少ない。本稿はこうした既存研究の穴を埋めるべく、スリランカ南部における自然実験的環境に着目し、フィールド実験によって独自に収集したデータを用いて、(1)公共財投資、(2)社会関係資本の蓄積、(3)生産活動ネットワークの形成、(4)相互扶助ネットワークの形成、(5)利他的選好の五つの参加動機を厳密に比較した。分析結果によれば、社会関係資本の蓄積及び相互扶助ネットワーク形成が主な参加動機である。さらに、リスクに対して脆弱な家計は相互扶助ネットワークを形成できないことも示されており、このことがさらに家計を脆弱にする可能性がある。つまり、社会関係資本への投資欠如を通じた貧困の罠の可能性が示唆されている。

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