

Collective Action and Community Development: Evidence from Women's Self-Help Groups in Rural India^a

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Abstract

In response to the problems of high coordination costs among the poor, efforts are underway in many countries to organize the poor through “self-help groups” (SHGs)—membership-based organizations that aim to promote social cohesion through a mixture of education, access to finance, and linkages to wider development programs. We randomly selected 32 of 80 villages in one of the poorest districts in rural India in which to establish SHGs for women. After two years of exposure to the intervention, women in treatment villages were more likely to participate in group savings programs, exerted greater control over household decisions, and displayed greater civic engagement than women in control villages. To investigate the sources of cooperation further, we conducted a simple multi-round public-goods game in 14 villages. We find that players who have been exposed to SHGs converge towards a cooperative equilibrium faster than those who have not. We also find that SHG women discount the risk of non-cooperation by others more than women in control villages. We conclude that SHGs and other membership-based organizations for the poor, where they promote collective action do so not by enforcing a commonality of tastes, but by reducing uncertainty surrounding cooperation.

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1. Introduction

Collective action – coordinated actions by groups of individuals who seek to achieve common goal --- plays a critical role in the development of societies. Recent research suggests that it also contributes to poverty alleviation: Collective action by the poor can strengthen property rights (Baland and Platteau 2003; von Braun and Meinzen-Dick 2009), increase their bargaining power in labor markets (Bardhan 2005), improve access to financial markets (Karlan 2007) and increase investments in public goods (Alesina, Baqir et al. 1999; Banerjee and Somanathan 2007).

An important question from the standpoint of policy is where collective action comes from, and why it emerges in some communities and not others. Rational choice models suggest that collective-action is almost always difficult to achieve: contributions to the collective or public goods are costly, but benefits shared by all, so individuals almost always face an incentive to free-ride on the efforts and contributions of others (Olson 1965). Other research however, illustrates that people are innately social and construct formal and informal social institutions to reward collective action and punish free-riding (Bowles 1998; Ostrom 1998; Henrich et al. 2001; Fehr and Gächter 2000; Ostrom 2000; Ostrom and Ahn 2009). Overall, this literature suggests that collective action is likely to emerge under some key conditions: individuals must have low costs of information, the opportunity to coordinate their actions, the opportunity to engage in repeated interaction, and the power to reward contributors and punish free-riders. Given that these constraints are often binding for the poor, it follows that almost everywhere, the poor demonstrate lower levels of organization and collective action (Narayan, Patel et al. 2000; Gugerty and Kremer 2008).

This paper examines whether external actors (such as NGOs) can lower the barriers for collective action in poor communities. We focus on a group for whom the constraints for collective action are likely to be particularly binding: rural women in one of the poorest districts in North India. This group is characterized by some of the lowest levels of literacy, labor-force participation and autonomy in the world (King and Mason 2001; Sen 2001; Sen and Dreze 2002).⁴ The practice of patrilineal inheritance, early marriage and large physical distances between natal homes and marital homes limit women's agency, bargaining power and capacity to organize (Dyson and Moore 1983; Rosenzweig and Stark 1989). Moreover, rural communities in North India remain highly divided along the lines of religion, caste and tribe, with low levels of participation in civil society organizations (Chhibber 2001). These factors combine to make it difficult for women to organize themselves spontaneously.

We examine the impact of organizing rural women into "Self-Help Groups" (SHGs), which are "membership-based organizations" that are typically composed of 10-20 women who meet routinely to save and coordinate their actions to meet common economic, political and social objectives (Chen, Jhabvala et al. 2007). The intervention we study is facilitated by the Self-Employed Women's Association (SEWA) in the district of Dungarpur, Rajasthan within the framework of a randomized control trial (RCT): 32 villages are provided services by the NGO and 38 additional villages were selected as controls. The NGO lowered the barriers to collective action in this community in several ways. Most importantly, door-to-door visits and group meetings held by literate and educated SEWA field-workers provided local women with information about opportunities for saving, credit, employment and access to government schemes. They also assisted with the gathering of documents, filling up of forms, filing of

⁴ Adult female literacy currently stands at 51 percent for women and 76 percent for men (World Development Indicators, 2012). These numbers are generally lower, and the gender-gap larger, in rural areas.

applications, interactions with local government officials, etc. Field workers also supported the groups by reminding women to attend meetings, motivating them to work together, arbitrating disputes, and providing routine counseling. While groups were trained to elect their own leaders and govern themselves, field workers provided constant oversight of the process to ensure that rules were adhered to. This ensured that heterogeneous women were able to work together towards a common goal and avert the problem of free-riding. In some instances, the NGO was also able to provide women with additional supports such as child-care services, employment training programs, leadership training programs, etc.

The paper makes three contributions. First, it demonstrates that through such programs, external actors can indeed lower the barriers for collective action among individuals who are economically, politically and socially marginalized. Second, it demonstrates that the programs themselves can contribute to broad improvements in well-being. Data from baseline and end-line surveys are used to illustrate that the intervention had a wide range of impacts not only for the women who participated, but for all women in a village where programs were present. Following two years of exposure to SHGs, women in treatment villages were more likely to participate in group programs, had acquired greater “personal autonomy” (including greater control over household decision-making), had taken collective action on issues such as the drinking water supply, and were more likely to be knowledgeable of and involved in community affairs, than their counterparts in control villages.

A third contribution of this paper is to investigate the channel through which the intervention may encourage collective action. We hypothesize that repeated social interaction within SHGs increases intra-group trust and thus makes cooperation a self-reinforcing equilibrium. We test this hypothesis by conducting a basic, repeated public-goods game played

with groups of 8 – 14 women in several treatment and control villages. Although group members in both treatment and control villages converge towards a cooperative equilibrium, we find that women in SHG treatment villages do so at a faster rate than women in control villages. There is also less inequality in final payouts across players in SHG villages. We infer that SHGs improve well-being not by promoting the convergence of individual preferences, but by reducing individual-specific uncertainty surrounding cooperation.

The remainder of this paper is organized as follows. Section 2 presents a review of related literature on self-help groups in India. Section 3 describes the research setting and provides an overview of the intervention. Section 4 presents the empirical results of the impact evaluation of the SHG program by comparing outcomes in treatment and control villages between 2007 and 2009. Section 5 explores the behavioral aspects of collective action by presenting the results of experimental games played in treatment and comparison areas. Section 5 concludes.

2. Background: Self-Help Groups in Rural India

SHGs are “membership-based organizations”, i.e. organizations whose members provide each other with mutual support while attempting to achieve collective objectives through community action (Chen, Jhabvala et al. 2007). A typical Indian SHG consists of 10-20 poor women from similar socio-economic background who meet once a month to pool savings and discuss issues of mutual importance. They are facilitated by NGOs, the government, and in some cases, even the private sector. Facilitators typically oversee the operations of the group and “link” women to formal institutions such as banks or government programs. They often add on other services such as childcare services, extra-curricular programs for school children, and job-

training programs. SHGs also have important social functions: they may serve as a platform to address community issues such as the abuse of women, alcohol, the dowry system, educational quality, inadequate infrastructure, etc.

The focus on women is critical to the SHG movement. More than 80 percent of all Indian SHGs are women-only (NABARD, 2011). This is for several reasons. First, a vast literature that now demonstrates that public investments in women empower them to make choices that benefit not only them as individuals, but also their families and communities (Schultz 1995; Nussbaum 2000). Second, there is also evidence that women are less risky borrowers, and more responsive to the threat of social sanctions that form the basis of recent group lending schemes (Armendáriz and Morduch 2005). Third, this policy reinforces other policies that aim to improve women's participation in local politics in India. A third of all seats in democratically elected village-institutions are now reserved for women. In some cases, this leads to policy decisions that better reflect women's preferences (for example, the prioritization of drinking water), but there are plenty of cases where women serve as "token" appointments and their authority is limited by dominant elites (Chattopadhyay and Duflo 2004; Ban and Rao 2008). Investments in SHGs are often cited as an investment in grass-roots democracy.

Women's SHGs have been heavily promoted by the Indian government, particularly in the southern states since at least since the 1980s (Galab and Rao 2003; Deshmukh-Ranadive 2004; Reddy and Manak 2005; Basu 2006; Chakrabarti and Ravi 2011). One of the largest microcredit operations in the world – the SHG linkage program – links these groups to formal credit providers (NABARD, 2011). Several large development programs, such as the Integrated Rural Development Program (IRDP), the *Swarnjayanti Gram Swarojgar Yojana* (SGSY) and most recently, the National Rural Livelihood Mission (NRLM) have provided a wide range of

benefits to these groups. The NRLM in fact envisions eventually mobilizing *all* rural, poor households into SHGs and producer groups in the states of Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Orissa, Rajasthan, and Uttar Pradesh—some 150 million citizens—by the year 2015 (Planning Commission 2011).

Despite the large scale-up in the number of SHGs in India in recent years, the impact of these groups on the lives of women remains poorly understood. Efforts to measure impact are typically constrained by the non-random placement of programs, the non-random assignment of individuals to groups and wide variations in the methods employed by these organizations. A recent report studied 214 SHGs in 108 villages across two northern and two southern states (Sinha 2006). The study found that SHGs indeed promoted collective action and succeeded in organizing women. In 25 percent of SHGs, a woman ran for local political office. 30 percent of SHGs were involved in community actions such as improving community services (43 percent of the total actions, including water supply, education, health care, veterinary care, village road), trying to stop alcohol sale and consumption (31 percent), contributing finance and labor for new infrastructure, (12 percent), protecting natural resources and acts of charity (to non-members).⁵ 25 percent of groups also undertook a joint enterprise, joint production or joint marketing exercise. The study however, has some important limitations because it only focuses on a select sample of groups that were formed in the 1990s and persisted for several years. Groups were chosen by the facilitating NGOs and may not be representative of SHGs in general and communities in which they were established may also not be representative of rural-India in general.

⁵ The authors do not include activities such as cleaning the village before village functions – which community leaders increasingly find SHGs useful for. Nor do they include general participation in campaigns or rallies - pulse polio, literacy, anti-dowry, for example – for which SHGs are becoming a means of mobilizing women.

A set of recent studies has also focused on SHGs in the state of Andhra Pradesh, which accounts for 40 percent of all SHGs in India (Galab and Rao 2003; Aiyar, Narayan et al. 2007). Several studies have evaluated the *Velugu* program, which was an SHG program implemented by the State via an independent organization that was headed by the state's Chief Minister. While the program's core involved microfinance and SHG-Bank linkages, it also included additional features such as the establishment of grassroots institutions, the provision of community investment funds, and the training of SHGs to address social problems such as child labor, gender inequalities and caste inequalities. The program was widely touted as increasing incomes, reducing poverty, improving women's participation in household decisions and civic engagement (Aiyar, Narayan et al. 2007) but we are not aware of a rigorous quantitative evaluation.

The most rigorous attempt to evaluate SHGs comes from Deininger and Liu (2009) and also focuses on Andhra Pradesh. The State government together with the World Bank began promoting SHG formation through the bank-linkage model in the 6 poorest districts of Andhra Pradesh in 2000 and subsequently to the remaining districts 3 years later. In addition to providing only credit and savings as previous SHGs had done, these SHGs also provided in-kind food and access to insurance. The authors use data from household surveys conducted in 2004 and 2006 to conduct propensity score matching and construct difference-in-difference estimates. Estimates from propensity-score-matching methods suggest that program had three main impacts: increases in social capital and economic empowerment, nutritional improvement (despite persistent drought at the time), and an increase in consumption for participants of new groups. The findings did not, however, find increases in income or assets, but interestingly, the effects were not limited to group members, indicating spill-over effects for communities in which SHGs were

formed. Estimates from difference-in-differences, constructed by exploiting the timing of the program roll-out suggested that exposure to the program over 2.5 years resulted in higher consumption, nutrition levels, and asset accumulation for poor participants. Spillover effects were not observed when these methods were used. The main limitation of this analysis however, is the central assumption that women that received the program early on (poorer clients) were fundamentally similar to those that received the program in the second roll-out. Propensity-score matching methods can only “match” on a few observables, while selection may be driven by a wide range of unobserved attributes such as social status, prior exposure to outside institutions and the level of cooperation and support received by a woman from her husband and in-laws.

Some recent literature also examines the organizational structure of the groups themselves. Some research shows that the inequality and heterogeneity of participants can affect the stability of groups, and/or the incidence of “elite capture” (Lanjouw and Ravallion 1999; Gaiha 2000; Mansuri and Rao 2004; Galasso and Ravallion 2005; Jha, Bhattacharyya et al. 2009). Most studies find that the problem is highly context-specific and varies widely across programs, levels of government, countries, and regions. The risk of elite capture is particular strong in India however, considering that rural India remains highly stratified and divided along the lines of caste, class and gender. A recent paper by Jha, Bhattacharyya et al. (2009) for example, find that the size of landholdings in a targeted population is a negative predictor of participation in the National Rural Employment Guarantee Program (NREGP) in the Indian state of Rajasthan, but the opposite pattern is observed in the state of Andhra Pradesh. Comparisons of land inequality, ratio of NREG and slack season agricultural-wage rates, political interference, and geographical remoteness across the two states suggest that the extent of program capture, and the identity of those who are able to capture, may vary between the two states.

Some fundamental questions about SHGs, however—such as whether they succeed in mobilizing women and in alleviating poverty—remain unanswered, including their impact on access to public goods and their effects on cooperative behavior among women. The extent of elite capture for programs aimed at women in particular also remains poorly understood. In the next section, we describe our intervention to study these issues.

3. Context and Experimental Design

3.1. Setting

Research was conducted in Dungarpur district of Rajasthan, India, a largely rural district of 1.1 million located on the southern “tribal” belt between Rajasthan and Gujarat. The population is largely composed of members of “scheduled tribes”—one of the politically least-mobilized groups in India.⁶ Levels of socio-economic development in Dungarpur are quite low relative to the rest of Rajasthan, which is already one of the lowest in India. In 2005 the per capita income of Dungarpur stood at Rs. 12,474 (approximately \$312) compared to the state average of Rs. 16,800 (approximately \$420). 21 percent of the population lives below the rural poverty line (Government of India 2009). Literacy levels are only 66 percent among men and 31 percent among women. 76 percent of the population is engaged in agriculture (Census of India, 2001). In 2004, the Indian Planning Commission included Dungarpur in its Backward Districts Initiative which aimed to address the problems of low agricultural productivity, unemployment,

⁶ 65 percent of Dungarpur’s population belongs to scheduled tribes, with the highest concentration in the South of the district. The dominant tribe here is that of the *Bhils*. This tribe’s occupancy in the Aravalli range (one of the oldest mountain ranges in the world) is said to date back to 4000 BC (Government of India 2009).

and to fill critical gaps in physical and social infrastructure through the efforts of both the central and state-level government interventions in the 100 least-developed districts.^{7,8}

In 2007, district authorities invited a well-known NGO with a long history of establishing SHGs in Gujarat, the Self-Employed Women's Association (SEWA). SEWA, founded as an offshoot of the Textile Labor Association by the activist Ela Bhatt in 1972, is a trade union for informal-sector women. SEWA claims a membership of over 1 million women in 7 states of India. Its main mission is to organize women to help them achieve economic independence through “self-reliance”(Chen 1991; Datta 2000; Bhatt 2006).⁹

3.2. Program

SEWA began a rollout of a rural SHG development pilot—known as the “Sustainable Livelihoods” project—in Dungarpur district in late 2007. All villages on the census listing for Dungarpur were stratified according to average female literacy rate, total village population, and average household size. From these strata, 32 villages were randomly selected for the SEWA program, 48 villages selected as control villages (80 villages in total). The rollout of the program proceeded in several steps. First, all women in a village were invited to become members of

⁷ The identification of backward districts within a State has been made on the basis of an index of backwardness comprising three parameters with equal weights to each: (i) value of output per agricultural worker; (ii) agriculture wage rate; and (iii) percentage of SC/ST population of the districts.

⁸ A sum of Rs. 15.00 crore per year (approximately \$3 million) will be provided to each of the districts for a period of three years i.e. a total of Rs. 45.00 crore (approximately \$9 million) per district.

⁹ SEWA's definition of self-reliance encompasses more than employment and economic independence, and includes women's ability to make independent decisions and have a voice at home and in their communities. Collective action is central to this mission. A recent annual report summarizes this as follows: “Self-employed women must organize themselves into sustainable organizations so that they can collectively promote their own development. They can be organizations at the village level, at the district level, at the state level, at the national or international level. They can be registered as co-operatives, societies, producers associations or even remain unregistered. Their members may be self-employed women directly, or primary organizations of self-employed women (SEWA 2008: 12)”.

SEWA by paying a nominal fee of Rs. 5 (approximately \$0.10).¹⁰ Members participated in a full day of basic training programs that were intended to create a sense of unity and direction, and an understanding of SEWA's objectives. SEWA members were then organized into SHGs. These groups typically consist of groups of 10 – 20 women with an elected leader. All these activities were led by SEWA field workers: two local married and educated women with 12 years of education who are highly regarded by the local community. These field workers report to a SEWA coordinator, who works from the SEWA office in Dungarpur town. The team of SEWA workers made considerable attempts to ensure that the intervention was participatory and socially inclusive. They held open meetings, disseminated information along local networks (for example, through school teachers, health care workers, government employees, home visits based on official lists of individuals who fall below India's nationally poverty line) and held meetings with community leaders to spread information and ensure that the poorest women were able to participate.

Once SHGs were formed and leaders were elected, participants would meet once a month and set savings targets of Rs. 25 – 100 each. These were deposited into a savings account at an SHG-linked bank. SHG meetings were also used to discuss other issues—details of job training programs, motivational messages, the importance of participating in local government, etc. SHG leaders were trained to manage the group, maintain minutes of meetings, manage group accounts, and monitor the group's activities. All meetings were attended by SEWA field workers, who provided women with information about government schemes/programs and their eligibility for those programs. Since most women were illiterate, they also helped with other

¹⁰ Recruitment of members is carried out by making announcements about SEWA at village Panchayat meetings, and/or private meetings with educated and influential members of the village who then spread awareness about SEWA's programs. SEWA volunteers and employees also meet with randomly selected women in the privacy of their homes, encourage them to join SEWA and spread awareness about SEWA programs among friends and family.

activities such as recording minutes of the meetings, assisting in necessary activities such as filling out all necessary paperwork at the local bank and/or arbitrating in the event of any dispute between the women. In addition to these activities, SEWA also conducted educational programs, job-training programs and employment/income-generation workshops. These programs were always open to all women in a village, not just SEWA members. They were almost always very well-attended. All meetings emphasized the importance of collective action and encourage women to engage in community issues.

4. Program Impact: Results using Survey Methods

We measure the impact of SEWA programs on all women in our sample who reside in villages where SEWA programs were implemented. We use this measure of “treatment” rather than a direct measure of actual participation in SEWA programs, mainly because the intervention was randomized at the level of the village (rather than at the individual level), and we wish to avoid the problem of estimating the program’s impact on the self-selected group of participants. This strategy is also motivated by two additional reasons. First, low female mobility causes women’s networks in rural North India to be highly localized and concentrated in their villages of residence (Dyson and Moore 1983; Jeffrey and Jeffrey 1996). New information introduced into a single village can diffuse along such social networks quite quickly, leading to the rapid spread of information and social learning (Munshi 2007).¹¹ Second, SEWA’s integrated

¹¹ Diffusion is likely to be particularly strong in Durgapur, where we observed that villages were typically quite small (<1000 people), villages were often physically separated by hills and inter-village transport was often restricted to narrow dirt-tracks.

approach is designed to promote spillovers in rural communities and change prevailing attitudes of both men and women of communities.¹²

Baseline and follow-up surveys of the study area were conducted in 2007 and 2009. These form a pooled cross-section with treatment and control samples. The sample of treated women includes a total of 1,410 women who resided in the villages where SEWA programs were in place. 748 of these women were interviewed in the 2007 baseline and 662 interviewed in the 2009 follow-up. The sample of control women includes 1,795 women who did not reside in SEWA villages over the two year period, with 855 interviewed in 2007, 940 in 2009.¹³

4.1. Outcomes of Interest

Based on past studies of SHGs, other participatory programs, and other poverty-alleviation programs in India that are focused on marginalized women, we expect the SHG program to have wide-ranging effects on economic, political and social indicators.

Savings and Labor Force Participation

In the long-run, participation in SHGs could be expected to increase income, assets and labor force participation rates. In the short-run however, which is the focus of this paper, we expect the presence of SEWA programs to increase women's participation in group programs that are aimed at increasing saving, access to credit and employment. We measure participation as a simply dummy variable that takes value 1 if a woman reports any participation in such

¹² Non-members are always invited to participate in SEWA activities and members are encouraged to draw non-members into collective activities whenever possible. Moreover, women are encouraged to participate in local politics and community events, where information about SEWA programs is often highlighted.

¹³ These villages may have other SHGs besides SEWA's operating but none received SEWA's Sustainable Livelihoods intervention. 5 villages that were originally designated as treatment villages were reclassified as control villages because SEWA programs were not implemented till after the completion of the follow-up survey in December 2009. The delay in establishing programs in these villages is attributed to the presence of another NGO that was operating in these villages. All results in this paper are robust to the exclusion of these villages from the sample completely.

programs and 0 otherwise. Women in treated villages are also expected to save more (within or outside a saving group). For this, we define binary variables coded 1 if the woman reports that she saves money each month and 0 otherwise. Since SHGs seek to increase female participation in the labor force, we also define two binary labor-participation indicators—relating to the general workforce, and the agricultural sector—coded 1 if a woman is employed, and coded 1 if she is employed in agriculture, and 0 otherwise.¹⁴

Household Decision-Making

If SHG membership raises a household’s current and future income by increasing labor participation and returns on savings, we expect the presence of SEWA programs to increase women’s decision-making autonomy within their households. Higher wages also increase the opportunity costs of woman’s time, lowering the demand for children and the likelihood of contraceptive use. We thus examine respondent’s involvement in three types of decisions: children’s schooling, medical decisions, and family-planning. We define dummy variables that take value 1 if a woman reports that she is able to make independent decisions in these matters and 0 otherwise.

Further, we hypothesize that access to a female “safety-net” in the village should increase women’s participation in these types of decisions, even if she is not directly a member of the group. We measure this using dummies that take value 1 if a woman reports that she has a “final say” in matters of children’s schooling, family medical decisions, and the practice of family-planning, and 0 otherwise. Summary statistics of all variables are presented in Table 1.

¹⁴ We do not consider measures of income or asset holdings mainly because the gap between our baseline and endline surveys is only two years. Many groups took several months to establish and begin their operations and thus became eligible to receive credit and other benefits from poverty-alleviation programs at different times. We plan to explore this further in the next round of our survey, expected next year.

Civic Inclusion and Engagement

SEWA programs disseminate information about local institutions, governmental programs, policies and procedures. In other words, they lower the cost of accessing information regarding community issues. We measure respondents' knowledge of where to report four types of grievances: problems with water/sanitation, poor road conditions, faulty electricity supply, and inadequate education and health services (all variables take value 1 if the woman knows where to report a grievance in the village and 0 otherwise). We also measure whether she has actually approached authorities to report a complaint and demand improvements in delivery, again using a variable coded 1 if the woman reports that she has reported a grievance at least once in the preceding two years, 0 otherwise.

We also test the hypothesis that participation in SHGs expands women's knowledge of authority structures in the village and motivates them to redress grievances about public issues. We measure this in three ways. First, we examine women's knowledge of where to report five types of grievances: water/sanitation, road conditions, electricity supply, education services, and health services. These variables take value 1 if the woman knows where to report a grievance in the village and 0 otherwise. Second, we examine whether women are aware of bribes being collected from villagers by public officials, coded 1 if they personally know someone who has been asked to pay bribes, 0 otherwise. Finally, we also measure women's participation in the main local governmental institutions, the Gram Sabha and Gram Panchayat.¹⁵ These are

¹⁵ The Gram Panchayat is the local governing body of a village or small town in India. It is the foundation of India's system of grass-roots governance. It is generally composed of 7 to 31 members and performs functions such as the resolution of local disputes, the implementation of development schemes for the village, the establishment of primary health centers and primary schools, arrangements for clean drinking water, drainage, and the construction and repair of roads. The Gram Sabha is composed of all men and women in the village who are above 18 years of

measured by two dummies. The first takes value 1 if the respondent knows of the Gram Sabha and the Gram Panchayat and 0 otherwise. The second takes value 1 if the woman has ever engaged with both institutions (by attending meetings and/or interacting panchayat members outside of meetings) and 0 otherwise.

Public Goods Satisfaction

We examine reported changes in levels of satisfaction with public services. We focus on the same set of public goods that we examined when considering their knowledge of grievances and actions taken to address grievances: access to drinking water, electricity, roads and quality of institutions for health and education. Our survey asked women whether the state of each of these services was “very bad,” “bad,” “somewhat good,” or “very good.” To measure satisfaction, we define a binary variable that takes value 1 if a woman reports that a particular service is “somewhat good” or “very good” and 0 otherwise. We expect public services to improve in villages with strong SHG participation, on the assumption of enhanced bargaining strength vis-à-vis service providers. However, we are unable to identify whether improvements occurred because women succeed in taking public action (as measured above) or because local governments make a greater effort to improve service-delivery.

Summary statistics of all variables used in the analysis, across both treatment and control areas, and both before and after the intervention, are presented in Table 1.

age. Meetings of the Gram Sabha are usually convened several times a year. In Rajasthan they are typically held twice a year. The agenda typically includes the annual budget, the development schemes for the village, and where necessary, individual difficulties or grievances of the people of a village. The Gram Sabha plays a critical role in holding government institutions, particularly local panchayat members, accountable.

4.2. Pre-Program Differences

Establishment of a causal relationship between the SEWA program implemented in late 2007 and the observed outcomes in 2009 requires an analysis of pre-program differences between treatment and control villages. If for example, the two areas differ in characteristics that are associated with improvements in socio-economic well-being before or after the program was established in 2007, estimates of the SEWA program could be biased.

Comparisons of pre-program characteristics are presented in the first three columns of Table 2 (individual-level estimates) and Table 3 (village-level estimates). Estimates in column 3 in each table contain the difference in mean outcomes between treatment and control populations prior to the treatment. Estimates are obtained from weighted regressions with robust standard errors clustered at the village-level. Note there is no evidence that the treatment villages had more SHGs prior to the arrival of SEWA. There is also no systematic difference in women's schooling, labor-force participation or involvement in SHGs prior to the program. We do however, note some other pre-intervention differences. Estimates in Table 2 illustrate that women in SEWA villages were less likely to be in the habit of saving prior to the program, were more likely to participate in the agricultural workforce, had lower levels of participation in family-planning decisions, higher levels of satisfaction with electricity services and lower levels of satisfaction with sanitation services. Our selected sample in SEWA villages was slightly older, belong to ST groups and reside in kutchha houses. These estimates, however, disappear when looking at village-level averages (Table 3), indicating that these initial differences may be driven by a small number of distinctive villages. We also present results that control for these, and other, possible factors.

4.3. Estimates of Unconditional Impact

We begin by comparing women who reside in the treatment villages with those who reside in the control villages before and after the intervention. Unconditional estimates of the program's impact are presented in Columns 5 – 7 of Table 2 (individual-level estimates) and Table 3 (village-level estimates). Estimates in column 6 in each table contain the difference in mean outcomes between treatment and control populations after the treatment. Estimates are obtained from weighted regressions with robust standard errors clustered at the village-level. Note from Table 2 that treated individuals did not significantly differ from their untreated counterparts prior to the SEWA programs, but after the program SEWA members are significantly different in several ways. They are 22 percent more likely to participate in group programs and 7 percent more likely to save regularly (Table 2). These estimates are significant at the 1 percent and 5 percent level respectively.

Differences in employment however, are negligible. There is no overall effect on employment, and though about 4 percent of women report shifting away from agricultural to non-agricultural employment, the effect is not statistically significant. In the case of village-level averages (Table 3), the positive effect of the treatment on non-agricultural employment is of equal magnitude (i.e. 4 percent) but is statistically significant. The unconditional effects of the program on employment are however, likely to be influenced by the presence of a large public works program that was the outcome of the Mahatma Gandhi Rural National Rural Employment Guarantee Act (NREGA) passed in parliament in 2005. The program is a job guarantee scheme that provides a legal guarantee for one hundred days of employment in every financial year to adult members of any rural household willing to do public work-related unskilled manual work at the statutory minimum wage of Rs. 120 (US\$2.39) per day in 2009 prices. The program was

rolled out in this area shortly after we began our intervention, and was popular in both treatment and control areas. While the program appears to have benefitted both areas, we believe it is important to condition on the presence of this program. This will be done later in this section.

Unconditional estimates of impact also indicate that SEWA programs strengthened women's participation in household decision-making. Treated women are 3--6 percent more likely to have a say in decisions about children's schooling and medical decisions as well as decisions about family-planning (Table 2) and the effects are significant at the 1 percent level in all but the case of the family-planning decision, which is significant at the 5 percent level. The magnitude and significance of the coefficients are similar when constructed at the village level (Table 3).

The results also indicate that women in treatment villages were more likely to know about where to report grievances related to the failures of public services: these estimates range from 16 percent for water, 6 percent for roads, 11 percent for electricity, and 8 percent for education and health institutions. For the case of water, estimates are significant at the 1 percent level. Treated women were not only more knowledgeable about where to report their grievances, but also more likely to take action and actually report a grievance to the concerned authorities. These estimates are 12 percent for the case of drinking water, 8 percent for electricity, 6 percent for education and health services and 4 percent for roads. The estimate for water is significant at the 1 percent level, and the effect for education and health services is significant at the 6 percent level. Given the low levels awareness and action at baseline (Table 1), these are significant improvements. The case of drinking water is particularly striking. On average, across our entire sample in both periods, only 24 percent of women were aware of where to report grievances about drinking water and only 21 percent of women had ever made the effort to report a

grievance to the authorities. Treated women in 2008 were thus 40 percent more likely to be aware of where to report drinking water problems, and 60 percent more likely to take action in the case of poor service delivery. This is a significant and important difference, particularly in light of the fact that women in rural Rajasthan are responsible for fetching drinking water and spend considerable amounts of time on this activity. Estimates regarding the levels of satisfaction with public services further reinforce these results. Note that women in treatment villages were 13 percent more likely to report that the supply of drinking water was “Adequate”. The effect was significant at the 5 percent level. Differential levels of satisfaction were smaller and not statistically significant for other types of public services.

Estimates in Tables 2 and 3 also suggest that treated women were also more likely to engage with local political institutions: they were 4 percent more likely to be aware of bribe-payments within the village and this effect is significant at the 10 percent level. They were also 4 percent more likely to be aware of the Gram Sabha and Gram Panchayat and 1 percent more willing to interact with these institutions. These effects are small and also statistically insignificant, but we return to examining them in estimates of conditional impact in the section ahead.

4.4. Estimates of Conditional Impact

Simple aggregate estimates of the program’s effect on households can be derived from a regression of the following form:

$$Y_{hvt} = \beta_0 + \beta_1 \text{SEWA Village}_v + \beta_2 \text{Post-intervention}_t \\ + \beta_3(\text{SEWA Village}_v \times \text{Post-intervention}_t) + \beta_4 X_{h,v} + \mu + e_{jt}$$

where Y_{hvt} is the outcome of interest for household h in village v in survey year t . SEWA Village takes value 1 if the village is a village in which SEWA operates programs, Post-intervention is a dummy variable that takes value 1 if the household was interviewed after the treatment program, X is a vector of household and village-level control variables, μ is a block fixed-effect¹⁶ and e_{jt} is a standard disturbance. The variable that is of chief interest is the interaction $SEWA\ Village_v \times Post\text{-}intervention_t$ which captures the impact of residing in a SEWA village after the intervention. Control variables include the respondent's age, literacy, marital status, household size, husband's age and literacy, scheduled-tribe status, and dummies for home/land ownership, kutcha (non-permanent) dwellings, and the presence of a toilet (as proxies for income and assets that are likely to be unaffected by a two-year intervention). We also include an indicator coded 1 if public-works programs from the National Rural Employment Guarantee (NREG) program were operating within the village during the survey year, on the assumption that presence of public works programs may affect village-level outcomes and may measure the effectiveness of village-level institutions. Finally, given the subjective nature of many of our dependent variables we include responses by women to questions about the quality of roads to their village on the assumption that this should be invariant across village households. The distribution of responses to this questions in equations including village-fixed effects, should therefore closely proxy individual bias. We use a dummy variable that takes value 1 if she reports that the village roads are either "bad" or "very bad" and 0 otherwise.

We omit the listing of control variables and present only the coefficients from treatment and post-intervention dummies, and their interactions in Table 4.¹⁷ Results confirm that two

¹⁶ Blocks, or *tehsils* are district subdivisions comprising multiple villages. In our sample, villages belong to one of three blocks.

¹⁷ These estimates are available from the authors on request.

years of exposure to SHGs resulted in improvements in several different aspects of well-being. First, women who reside in SEWA villages were 24 percent more likely to participate in group-savings programs and 11 percent more likely to be in the habit of saving money. The results are significant at the 1 and 5 percent level respectively.

Unlike the case of the unconditional estimates, we now find that women were also more 5 percent likely to be involved in non-agricultural employment, and the effect is significant at the 10 percent level. Controlling for the presence of the NREG scheme strengthened this coefficient. This possibly indicates that labor markets during the period of study were being considerably transformed by the NREG program. We cannot rule out the possibility that the transformation occurred at a different pace in treatment and control villages.¹⁸ Anecdotal evidence from field-workers as well as local government representatives suggests that the program was hugely popular among women from both treatment and control villages and they chose to participate in this program in large numbers. Both self-employment and entrepreneurship, already at very low levels in Dungarpur, fell even further as a result. Other research also confirms that the program was well-targeted in the state and did not suffer from the problems of elite-capture that have been seen in other states (Jha, Bhattacharyya et al. 2009).

Results in Table 4 also confirm that women in treatment villages experienced benefits of greater bargaining power within their households. Residence in a SEWA village is associated with 4--7 percent greater likelihood of participation in household decision-making. The effect is particularly noteworthy for family-planning decisions. Recall that prior to the program, women

¹⁸ In both 2007 and 2009, we observe no difference in either the intensity of the NREG program, or the timing of its rollout, between treatment and control villages, but it is possible that the program was rolled out quicker in group of villages.

in SEWA villages reported lower autonomy in such decisions relative to their counterparts in control villages.

Next, we explore the conditional estimates of impact on knowledge of where to report grievances, and a woman's actions in actually reporting grievances. Results indicate that women in treatment villages are 13 percent more likely to know where to report grievances regarding water, and are also 10 percent more likely to have actually reported problems of water access to village councils or district offices.¹⁹ It is also interesting to note that the conditional estimates of program impact for other types of public goods are not significant. We interpret this as evidence that women organize around issues that are of greatest relevance to them. Many other studies from rural India have documented the salience of this issue: women fetch water in rural India are consistently weight issues related to drinking water higher than issues with other types of public services, particularly roads, since these primarily used by men in rural India (Chattopadhyay and Duflo 2004; Joshi 2011). Interestingly, these patterns were not observed for any other type of public services – sanitation, electricity, roads or facilities for health or education. In all those cases, knowledge of where to report grievances, actual action on grievances and levels of satisfaction with the services themselves measured no statistically significant impacts.

The results also indicate that women who resided in SEWA villages were 5 percent more likely to know if anyone in the village had paid a bribe to either gain access to water for farming or to public officials. Two years of exposure to the program also resulted in a slightly higher (2 percent) village-wide likelihood of interaction with the Gram Sabha and Gram Panchayat. The magnitude of the impact is small, but it is possible that these are likely to intensify over time, particularly as women from the SHGs themselves take advantage of their political opportunities.

¹⁹ The effect of SEWA programs is as strong as the effect of literacy on these outcomes.

In summary, the estimates of program impact suggest that two years of exposure to SEWA programs resulted in a wide variety of “indirect” impacts for not only women who participated in the groups themselves, but all residents of a village. Women in SEWA villages are more likely to participate in group-savings programs, save money, obtain credit, have a final say in decision-making within their households, know where to report grievances about drinking water, seek to address grievances about drinking water, and know about local corruption. These indirect benefits are larger and more significant than the program’s effects on employment or income. This leads to an important question: how and why does participation in SHGs produce these effects? We demonstrate in the next sections that SEWA is likely removing steep barriers to intra-village coordination and facilitating cooperation. But first we demonstrate that exposure to SEWA is not resulting in a convergence of preferences.

4.5. Heterogeneity of Preferences

A wide body of evidence indicates that social and political fractionalization is prevalent in poor communities, and not merely in communities characterized by high levels of ethnolinguistic diversity. In India gender disparities, religious, caste, and tribal divisions, and other communal inequities are endemic even in relatively (ethnically) homogenous communities, and these inequities are often reflected in public goods choices (Pande 2003; Chattopadhyay and Duflo 2004; Hoff and Pandey 2006) We would expect, therefore, that any successful effort to promote cooperation by SHGs would ultimately hinge on whether the heterogeneity of preferences across individuals in poor areas can be managed.

In Dungarpur—as in other districts in the northwest tribal belt—a principal division is between those who are members of tribes and those who are not. The reservation of seats in

panchayats for historically disadvantaged groups—Scheduled Castes (SC), Scheduled Tribes (ST), Other Backward Castes (OBC), and women—has been a feature of political life since 1991, when the 73rd Amendment to the Indian constitution gave village governments the authority and the resources to appropriate funds for local public goods. However, there are notable differences between ST and non-ST groups. ST members, who are outside traditional caste structures, are more economically marginalized than SC/OBC groups that are considered at the bottom of the Hindu caste hierarchy (Banerjee and Somanathan 2007). More importantly, tribal communities are among the politically weakest groups in India, and in contrast to SC/OBC groups, have been slow to organize politically (Chandra 2005).²⁰

Over two-thirds of both the district population and our sample are comprised of Scheduled Tribes. We use ST information of survey respondents to determine whether the SHG intervention has affected the diversity of public-goods preferences. Returning to the question of principal concerns over public goods quality, table 4 examines the difference between ST and non-ST choices for the “number one” concern, pooled across villages, before and after the intervention. The figures in table 5 are the percentage of ST women listing any particular public good choice as their first priority, less the percentage of non-ST women doing the same; a positive number thus implies that a greater percentage of ST women selected the public good as the village’s first priority than non-ST women.

These results show no discernible reduction of preference heterogeneity between these groups. We see no greater narrowing of the spread between ST and non-ST preference regarding public goods from pre-intervention to post-intervention periods when comparing treatment and control villages. We also calculate a Herfindahl concentration index from the sum of the squared

²⁰ In the 1990s the Bahujan Samaj Party (BSP) came to rule India’s most populous state (Uttar Pradesh) principally as an SC-based political party.

percentages of respondents that expressed preferences for any particular public good (a lower number indicating a greater heterogeneity of preferences). ST respondents between the pre- and post-intervention periods became more dispersed in terms of their public goods preferences, but we see no difference between control and treatment villages, either within or across ST/non-ST groups, between the two survey periods.

Although we see survey evidence that that SEWA programs were able to achieve to encourage greater cooperation in terms of group activities, this does not appear to have been accomplished through change in the diversity of preferences across members. In the next section, then we follow up in a small number of surveyed control and treatment villages by conducting a basic public-goods game in order to examine the underlying processes of cooperation that may have emerged in such groups.

5. The Capacity for Collective Action: Results from Experimental Games

To assess the mechanisms that lead to cooperation among members of SHGs, we played a variant of the threshold public-goods game (Davis and Holt 1993; Ledyard 1995; Eckel and Grossman 2008). The combination of quantitative and qualitative research methods provides insights into the impact of SHG participation on the mindsets and behaviors of participants in the treatment villages.

5.1. The Threshold Public Goods Game

The game was implemented in each of seven treatment and control villages in 2011. Female participants were randomly selected in each village.²¹ Group sizes ranged from 8 to 14 but were made comparable across treatment and control villages as much as possible. Game players were briefly surveyed in order to obtain basic information regarding their age, socio-economic status, education, and occupation. Differences between the characteristics of treatment and control populations are presented in Table 5, showing no significant difference between the players in treatment and control villages.

Each subject was assigned a number, to be used throughout the game to ensure anonymity in the distribution of payouts. At the beginning of each round of the game, subjects were given coupons worth Rs. 20 and were told that these would be redeemable for cash at the end of the game. The players were then asked to place secretly any portion of the Rs. 20 worth of coupons into an envelope on which their identifying number was written, which they would then place into a box—explained to them as analogous to a village fund (*Lok Phada*). If the total amount contributed to the fund exceeded a certain threshold, that amount would be doubled and distributed back to the participants in equal amounts. If the threshold was achieved in the current round, it would be raised by 20percent in the subsequent round, and increased steadily to a maximum of $N \times 20 - 20$ where N is the number of players. If the combined contributions did not exceed the threshold, all contributions were lost for that round. All contributions and contributory decisions were made in secret as players were instructed not to discuss their actions with others, and thus no formal monitoring or sanctioning of individual behavior by the group

²¹ In treatment villages, our research team established contact with local SEWA leaders (*Agewans*) through both phone-calls and site visits. These leaders were told about the research project and were asked to randomly select women for participation in the games. In control villages, our research team established contact with local government leaders such as panchayat members, female health workers and other local government representatives (ASHA workers, *anganwadi* workers, etc.). These leaders were also told about the research project and were asked to randomly select women who were not affiliated to any types of SHGs at all.

was allowed. Players were not told when the game would end. Each game was played without revealing the number of rounds till the end of the game.

The stage game has two types of pure strategy Nash equilibria. In the first of these, each player contributes zero. There are no incentives for any player to deviate unilaterally from this strategy profile, even if by doing so the threshold would be met, since the amounts are distributed back to all participants in equal shares irrespective of whether they contributed or not.²² The second type of pure strategy equilibrium is a strategy profile such that the threshold is just satisfied, and all players contributing a strictly positive amount get back at least as much as they contributed. If the latter condition is not satisfied, then a contributing player would be better off contributing nothing. On the other hand, there are no incentives for any player to contribute any amount above the threshold since that amount would be shared equally with all other players. We refer to this second type of equilibrium as a cooperating equilibrium, and there generally exists many such equilibria with different combinations of contributions just satisfying the threshold. However, only one co-operative equilibrium is symmetric in the sense that each player contributes an identical amount.

In the repeated game, it is possible to use trigger strategies to sustain an infinite number of equilibria, some of which involve even higher contributions. In the games we organized, the participants did not know how many rounds would be played. This is typically treated formally as a game with an infinite horizon (reference??). In such a game, a strategy profile in which all players contribute their full amount as long as no other player deviates, and every player turns to contributing zero after a deviation, is the welfare maximizing Nash Equilibrium as long as all

²² Strictly speaking, this statement requires that the number of participants exceed two, since the contributions are doubled.

players are sufficiently patient. The repeated nature of the game should thus in principle make it possible to sustain a higher level of co-operation between the players.

This game and several variants of this game have been widely played in both classrooms and field settings.²³ Most of the research finds tremendous variations in the willingness of participants to contribute to the public good. Early research focused on the one-shot version of the game played among university students and found that contributions were 40--60 percent of the Pareto optimal level (Marwell and Ames 1979; Marwell and Ames 1980; Marwell and Ames 1981). Contributions tended to be lower if the initial endowments were unequal than the case where all participants had an equal endowment. In repeated games, it has been observed that cooperation diminishes over time and contributions converge close to the Nash equilibrium level or simply to zero (Isaac, Walker et al. 1984; Isaac, McCue et al. 1985). Contributions to the public good are also known to be higher in the presence of thresholds or provision points (Marwell and Ames 1980; Isaac, Schmitz et al. 1989; Cadsby and Maynes 1998), with homogeneous groups of female players (Cadsby and Maynes 1998), and an allowance for communication between players (Isaac, McCue et al. 1985). Other factors, such as group size, decision-costs, concepts of fairness, framing, etc. are all shown to matter as well, but there is little agreement in the literature on the precise direction of the effects. Some recent work also combines laboratory experiments on public goods with field experiments. (Laury and Taylor 2008) for example, found that individuals' contributions to a public good in the laboratory were not always able to predict their willingness to contribute to a public good in the naturally

²³ A thorough review of this literature is beyond the scope of this paper, but some notable papers include (Nunn and Watkins 1978; Marwell and Ames 1979, 1980, 1981; M. Isaac, J. Walker, and Thomas 1984; J. Andreoni 1995; M. Isaac and J. Walker 1988; Davis and Holt 1993; Cadsby and Maynes 1998; Abbink, Sadrieh, and Zamir 2002; Hauert n.d.; James Andreoni and Petrie 2004; Semmann, Krambeck, and Milinski 2003). Reviews of the literature are found in (Davis and Holt 1993; Janssen and Ahn 2003).

occurring world. On the other hand, (Carpenter and Seki 2006) find that social preferences exhibited in a public good game predict the productivity of fishermen in Japan. They find that fishermen who behave more pro-socially in experiments are more productive.

Our analysis differs from any of the above-mentioned papers in a critical way: we are focused on the *differences* between treatment and comparison areas. Since identical games were run in both sets of villages, we are able to attribute the differences in outcomes between the two sets of games to the treatment program and not to the structure of the game, innate behavioral biases (such as altruism or confusion about the rules of the game) or the framing of the game's rules.

We hypothesize that SEWA members and non-members will behave differently in these group games. Since SEWA members have the greatest exposure to group participation, understand the benefits of collective action and are accustomed to making decisions in groups of women, we expect them to display higher levels of trust and contribute greater amounts to the public-goods than their counterparts who are not members of SEWA. We also expect games with SEWA members to display lower levels of inequality than games with non-members, since free-riding is likely to be less common. Given our survey evidence on the externalities of SEWA programs, we also expect that non-members in SEWA villages will behave similarly to SEWA members. We expect even this group to show higher levels of cooperation than their counterparts in control areas.

5.2. Results

Average contributions per round are presented in Figure 1. Note that contributions in treatment villages exceed the contributions in control villages. Contributions to the public good

in the first round in treatment areas were higher than comparison areas by Rs. 3.8 or approximately 20 percent of the initial endowment. We also break down contributions in treatment areas into SEWA members (solid line) and non-members (dashed line) respectively. Note that in treatment villages, SEWA members on average contributed more to the public good both at the beginning of the game, but non-members rapidly increased their contributions rapidly. Overall, there was little discernible difference between the two groups: average contributions, across all rounds were only about Rs. 0.68 higher among SEWA members, and the difference is statistically insignificant.

Contributions in treatment villages also displayed lower dispersion than contributions in control villages (Figure 2). In both village types, however, dispersion declined over time, but more quickly in treatment villages. The low level of inequality in contributions (Figure 2) is driven by the near-complete absence of free-riders in these villages, even though some women had experienced benefits from free-riding in earlier rounds.

Achievement of Thresholds

The higher levels of cooperation in treatment villages are also seen in the patterns of threshold attainment. The threshold was attained about 62 percent of the time in treatment villages and only 50 percent of the time in control villages (See Table 7).²⁴ The extent of cooperation is also apparent from looking at the number of rounds played. Since the game ceased once the maximum common-fund threshold was reached, we see that the greater cooperation in treatment villages was associated with shorter overall games with an average game length of less than 5 rounds. The maximum threshold was reached in control villages after 6 rounds, on average, and in one village was not reached.

²⁴ Excluding one treatment village where the game was disrupted by male on-lookers, this increases to 75 percent.

Regression Results

Since the games varied in their length, and the choice of thresholds, comparison of earnings and other outcomes requires controlling for these differences. We estimated measures of game performance based on demographic characteristics and group fixed-effects, in addition to the treatment effect. Regressions take the following form:

$$Z_{i,r,v} = \beta_0 + \beta_1 \text{SEWA Member} + \beta_2 \text{SEWA Village, Non-Member} + \beta_3 \mathbf{X} + \mu_v + e_{i,r}$$

where $Z_{i,r,v}$ is the outcome of interest for individual i in round r of the game in village v . *SEWA Village* is the treatment-village indicator, \mathbf{X} is a vector of control variables, μ_v is a village-specific fixed-effect (to control for group-specific attributes such as how long the women have known each other and other village characteristics), and e_{ji} is a random disturbance. Additional control variables include age and literacy (measured on the basis of whether game players could sign their name). Additionally, we include round-specific controls, including round number and the threshold. We also include dummies for the individual days over which the games were played.

Table 8 and Table 9 present regression results for five outcomes: (1) contributions to the public good per round; (2) cumulative balance per round (i.e. endowment less contribution to the public good + earnings from the public good); (3) gross payouts per round (total earnings from the common fund distributed equally); (4) the net payout (gross payout less the contributed amount), and (5) the difference between a woman's payout and the amount she would have earned from contributing nothing to the public good, i.e. playing the Nash strategy of contributing nothing to the public good.

Estimates in Table 8 suggest that all individuals – both SEWA members and non-members – contribute approximately Rs. 4.00 (20 percent of the original endowment) more to the public good than women in control villages (Table 8, columns 1—3). Estimates also indicate that SEWA village participants also maintain higher balances: throughout the game, SEWA members hold an extra Rs. 17, while non-members hold an extra Rs. 14 compared to players in control villages (Table 8, columns 4—6). Higher contributions to the public good and higher balances throughout the game are associated with higher gross payouts: SEWA members receive an extra Rs. 25 and non-members in SEWA villages receive an extra Rs. 23 from playing the game than their counterparts in control villages. Higher levels of cooperation, and higher contributions to the public good in these villages led to higher payouts and thus greater improvements in balances and gross payouts.

Estimates in Table 9 further illustrate how well women in treatment villages fared in the game. Relative to control villages, net payouts, defined as gross payout less contributed amount, are Rs 18-20 higher for both SEWA members and non-members in treatment villages in each round (Table 9, columns 1—3). The gap between what women actually earned and the amount they would have earned had they played the Nash equilibrium of contributing nothing to the public good shows a similar pattern: relative to women in control villages, SEWA members and non-members both earned approximately Rs. 5.00 extra according to this metric (Table 9, columns 4—6).

These data can also be used to examine differences in strategies as well as outcomes for women as a function of their own gains/losses throughout the game. We examine the independent variable “net earnings” (payout less contributions) in the previous round of the game, to determine whether the propensity to contribute is affected by previous round net

gain/loss (Net payout_{t-1}) and interact this variable with residence in a treatment village ($\text{SEWA Village} \times \text{Net payout}_{t-1}$). This measures whether women who gained from free-riding were more or less likely to remain free-riders in subsequent rounds, or whether they were prompted to move to a more cooperative strategy, even at the cost of lower balances in their own account. Note that the coefficient for Net payout_{t-1} is negative (though not statistically significant) in the case of contributions to the public good (Table 8, Column 3), suggesting that women who received higher payouts in the previous round (for example, by free-riding), on average lowered their contributions in the following round. However, the coefficient for the interaction $\text{SEWA Village} \times \text{Net payout}_{t-1}$ is positive and statistically significant, indicating that women in treatment villages behaved in the opposite way: a player who profited in the previous round actually increased her contributions in the current rounds. Synchronization of strategies ensured that these women collectively achieved higher payouts than the zero-contribution strategy (Table 9, column 3). Note that lagged earnings and their interaction with the treatment indicator only affect current-round contributions and the difference between actual payout and the case where players simply kept the Rs. 20. Neither variable affects balances or gross or net payouts.

Overall, we note three results of interest. First, although women in both treatment and control villages engage in cooperative behavior, women who participated in the SHG treatment achieve a cooperative outcome more quickly than their counterparts in the control villages. Moreover, the gap between the most and least generous individuals narrowed more quickly in treatment than in control villages. Second, cooperative behavior is encouraged with the presence of a leader; but the cooperative effect of the leader is non-existent in treatment villages. Third, free ridership in control villages delays the emergence of cooperative behavior, whereas in treatment villages initial free riding hastens a cooperative result. Thus it is likely that the SHG

promotes cooperative behavior not through the management of group members' policy preferences but by reducing players' uncertainty surrounding cooperation. Under normal conditions, game players who free ride continue to do so in sequential rounds of game play. But among SHG members, free riding quickly disappears as those who achieve high earnings increase contributions to the common fund in subsequent rounds.

6. Conclusions

This paper has explored whether collective action can be promoted in communities by external actors. It examined an intervention by the Self-Employed Women's Association (SEWA) of India in the Dungarpur district of Rajasthan in India. Women in 32 randomly selected treatment villages were organized into SHGs. An additional set of 48 villages served as a control group. A dedicated group of SEWA field workers conducted an information campaign, organized the women and provided them with information, education and training to make decisions as a group. The field workers also provided regular oversight, support, and arbitration in the case of disputes or "free-riding" (real or perceived) and facilitated the group's interaction with formal institutions such as banks or government agencies.

A comparison of a baseline survey in 2007 and an endline survey in 2009 provide estimates of program impact, which we measure at the village level. We find that over the two years of its operation, "indirect" impacts of these programs – on women's autonomy and empowerment – largely outweigh the direct benefits on income and employment. Compared to the control group, women who live in villages with SEWA programs report greater participation in group programs (particularly for saving), increased say in domestic decision-making, greater awareness of where to express grievances about public-services (particularly drinking water), a

willingness to take action on grievances in the case of drinking water, and finally, an increase in satisfaction with the state of these services. We observe no significant impact of the program however on measures of income, consumption or employment.

We also explore the possible mechanisms through which these impacts are realized. We rule out the possibility that cooperation is achieved through top-down mechanisms that force preferences to converge. Survey evidence shows that SHGs have no effect on narrowing differences between women—and in particular, between tribal and non-tribal women—regarding preferences for public goods in treatment villages relative to controls. Rather our behavioral evidence suggests that SHGs change incentives structures for members by minimizing the individual risks of engaging in cooperation. In public goods games, we found that free riding tends to persist in control villages, but free riders tend to correct their behavior in subsequent rounds of play in SHG villages, even when group monitoring of individual behavior was not allowed. Although we cannot determine the precise means by which SHGs do this—whether it is due simply to the routinization of cooperative behavior that SHG activities promote—without further exploration, we can conclude that SHGs do reduce the uncertainty surrounding cooperation.

Taken together, these results suggest that external actors (such as NGOs, other civil society organizations or even the government) can in fact mobilize the poor and lower the costs of collective action in rural communities. SHGs or other types of membership-based organizations targeted to the poor can not only increase the propensity for collective action in local communities, but also empower women more broadly. But in order for these groups to be able to take further steps in improving livelihoods, increasing income and eventually the bargaining power of marginalized communities, these groups will have to move beyond their

current status as simple linkages between the public sector and (mostly) the rural poor. Given time and appropriately-designed incentives, these groups have the capacity to influence the processes of both economic and political development in significant ways.

Table 1: Summary Statistics of key variables (N=3205)

	Mean	Standard Deviation	Min	Max
SEWA Village	0.450	0.498	0	1
Post-intervention	0.500	0.500	0	1
SEWA Village × Post-intervention	0.217	0.412	0	1
Participates in group savings	0.220	0.414	0	1
In the habit of saving	0.198	0.398	0	1
Employed in any capacity (past three months)	0.783	0.412	0	1
Employed in agriculture (past three months)	0.720	0.449	0	1
Employed outside agriculture (past three months)	0.063	0.242	0	1
Final say: children's schooling	0.088	0.283	0	1
Final say: medical decisions	0.097	0.296	0	1
Final say: family-planning	0.031	0.173	0	1
Grievance: Water	0.245	0.430	0	1
Grievance: Roads	0.199	0.400	0	1
Grievance: Electricity	0.238	0.426	0	1
Grievance: Ed/Health	0.180	0.385	0	1
Addressed Grievance: Water	0.212	0.409	0	1
Addressed Grievance: Roads	0.173	0.378	0	1
Addressed Grievance: Electricity	0.181	0.385	0	1
Addressed Grievance: Ed/Health	0.110	0.314	0	1
Adequate drinking water	0.233	0.423	0	1
Adequate sanitation	0.215	0.411	0	1
Adequate electricity	0.214	0.410	0	1
Know of the Gram Sabha	0.361	0.480	0	1
Ever attended Gram Sabha	0.040	0.195	0	1
Know about Gram Panchayat	0.749	0.434	0	1
Know of Gram Sabha AND Gram Panchayat	0.230	0.421	0	1
Engage with Gram Sabha AND Gram Panchayat	0.014	0.118	0	1
Know anyone in the village who paid a bribe	0.038	0.192	0	1
Top issue in the village: water	0.885	0.319	0	1
Top issue in the village: sanitation	0.509	0.500	0	1
Top issue in the village: transportation	0.637	0.481	0	1
Top issue in the village: electricity	0.807	0.395	0	1
Top issue in the village: educational services	0.294	0.456	0	1
Top issue in the village: health services	0.471	0.499	0	1
Age	37.13	10.00	14	80
Literate	0.183	0.387	0	1
Married	0.945	0.228	0	1
Scheduled tribe	0.726	0.446	0	1
Husband age	40.67	9.990	1	77
Husband literate	0.082	0.275	0	1
Own house	0.849	0.358	0	1
Have own farm	0.877	0.329	0	1

Kutcha house	0.685	0.464	0	1
Household has toilet	0.072	0.259	0	1

Table 2: Pre- and post-program differences, individual data

	Pre-Program Differences			Post-Program Differences		
	SEWA Villages	Control villages	Difference (std err)	SEWA Villages	Control villages	Difference (std err)
Participates in group programs	0.132	0.146	-0.014 (0.030)	0.427	0.199	0.223*** (0.053)
In the habit of saving	0.155	0.194	-0.039* (0.023)	0.256	0.188	0.065** (0.030)
Employed (past three months)	0.798	0.768	0.030 (0.039)	0.784	0.783	-0.000 (0.051)
Employed in agriculture (past three months)	0.750	0.705	0.045 (0.041)	0.693	0.731	-0.038 (0.060)
Employed outside agriculture (past three months)	0.048	0.063	-0.015 (0.017)	0.091	0.053	0.038 (0.028)
Final say: children's schooling	0.092	0.087	0.006 (0.023)	0.130	0.055	0.067*** (0.019)
Final say: medical decisions	0.098	0.110	-0.012 (0.021)	0.131	0.061	0.063*** (0.021)
Final say: family-planning	0.018	0.055	-0.036** (0.014)	0.044	0.010	0.032** (0.012)
Know where to report grievance: Water	0.183	0.164	0.019 (0.027)	0.421	0.245	0.156*** (0.052)
Know where to report grievance: Roads	0.146	0.130	0.016 (0.026)	0.301	0.234	0.052 (0.051)
Know where to report grievance: Electricity	0.136	0.109	0.028 (0.027)	0.435	0.298	0.112* (0.060)
Know where to report grievance: Education/Health	0.163	0.159	0.004 (0.031)	0.258	0.159	0.082* (0.044)
Addressed Grievance: Water	0.160	0.139	0.021 (0.025)	0.349	0.220	0.128** (0.050)
Addressed Grievance: Roads	0.128	0.103	0.025 (0.025)	0.252	0.215	0.037 (0.046)
Addressed Grievance: Electricity	0.100	0.083	0.017 (0.021)	0.316	0.236	0.080 (0.048)
Addressed Grievance: Education/Health	0.086	0.091	-0.006 (0.024)	0.166	0.107	0.059* (0.033)
Know of Gram Sabha and Panchayat	0.215	0.218	-0.002 (0.035)	0.268	0.226	0.042 (0.049)
Engage with Gram Sabha and Panchayat	0.011	0.019	-0.008 (0.007)	0.018	0.009	0.010 (0.008)
Known anyone who has paid a bribe	0.040	0.055	-0.015 (0.015)	0.049	0.013	0.036** (0.015)
Adequate drinking water	0.166	0.174	-0.008 (0.056)	0.369	0.240	0.129** (0.056)
Adequate sanitation	0.132	0.164	-0.031 (0.034)	0.267	0.293	-0.026 (0.044)
Adequate electricity	0.222	0.198	0.024 (0.054)	0.235	0.208	0.027 (0.049)
Adequate roads	0.179	0.221	-0.042 (0.055)	0.490	0.445	0.045 (0.057)
Adequate facilities for health, education	0.479	0.519	-0.041 (0.058)	0.781	0.716	0.065 (0.046)
Age	37.39	36.35	1.044 (0.645)	36.69	37.97	-1.077* (0.618)
Literate	0.184	0.188	-0.004 (0.037)	0.213	0.186	0.057 (0.039)

Married	0.947	0.952	-0.006 (0.012)	0.923	0.952	-0.024 (0.015)
Scheduled tribe	0.668	0.730	-0.061 (0.100)	0.725	0.77	-0.057 (0.078)
Husband age	41.06	40.24	0.824 (0.710)	40.50	40.87	-0.463 (0.613)
Husband literate	0.086	0.083	0.003 (0.020)	0.095	0.070	0.023 (0.021)
Own house	0.861	0.835	0.026 (0.027)	0.805	0.884	-0.071** (0.030)
Have own farm	0.900	0.891	0.009 (0.040)	0.835	0.874	-0.027 (0.051)
Kutcha house	0.667	0.746	-0.079 (0.071)	0.642	0.676	-0.039 (0.060)
Household has toilet	0.098	0.081	0.017 (0.036)	0.073	0.045	0.025 (0.028)
Observations	748	855		662	940	

Table 3: Pre- and post-program differences, village data

	Pre-program Differences			Post-program Differences		
	SEWA Villages	Control villages	Difference (std err)	SEWA Villages	Control villages	Difference (std err)
Participates in group programs	0.115	0.171	-0.056 (0.039)	0.444	0.183	0.261*** (0.048)
In the habit of saving	0.148	0.200	-0.053 (0.034)	0.267	0.186	0.081* (0.041)
Employed (past three months)	0.773	0.779	-0.0053 (0.048)	0.775	0.787	-0.012 (0.048)
Employed in agriculture (past three months)	0.731	0.719	0.012 (0.049)	0.689	0.741	-0.052 (0.055)
Employed outside agriculture (past three months)	0.0424	0.0600	-0.017 (0.019)	0.0855	0.0453	0.040* (0.023)
Final say: children's schooling	0.080	0.082	-0.002 (0.021)	0.130	0.053	0.077*** (0.017)
Final say: medical decisions	0.084	0.100	-0.016 (0.022)	0.131	0.055	0.076*** (0.020)
Final say: family-planning	0.022	0.056	-0.034* (0.020)	0.044	0.008	0.036*** (0.009)
Know where to report grievance: Water	0.171	0.152	0.019 (0.027)	0.415	0.243	0.172*** (0.045)
Know where to report grievance: Roads	0.119	0.114	0.005 (0.026)	0.299	0.241	0.058 (0.052)
Know where to report grievance: Electricity	0.113	0.102	0.012 (0.027)	0.436	0.286	0.151*** (0.056)
Know where to report grievance: Ed/Health	0.163	0.147	0.016 (0.032)	0.255	0.158	0.097** (0.043)
Addressed Grievance: Water	0.149	0.131	0.018 (0.025)	0.335	0.219	0.117*** (0.042)
Addressed Grievance: Roads	0.105	0.0930	0.012 (0.023)	0.246	0.221	0.026 (0.046)
Addressed Grievance: Electricity	0.0889	0.0819	0.007 (0.022)	0.309	0.226	0.083* (0.044)
Addressed Grievance: Education/Health	0.105	0.0941	0.0113 (0.027)	0.160	0.106	0.053 (0.032)
Know of Gram Sabha and Panchayat	0.202	0.245	-0.043 (0.049)	0.262	0.212	0.0505 (0.051)
Engage with Gram Sabha and Panchayat	0.019	0.015	0.004 (0.009)	0.018	0.007	0.0112* (0.006)
Know anyone who paid a bribe	0.042	0.051	-0.009 (0.634)	0.049	0.013	0.036*** (0.003)
Adequate drinking water	0.146	0.144	0.002 (0.967)	0.372	0.244	0.128*** (0.023)
Adequate sanitation	0.146	0.185	-0.039 (0.375)	0.264	0.300	-0.0358 (0.413)
Adequate electricity	0.221	0.175	0.045 (0.312)	0.227	0.214	0.0125 (0.805)
Adequate roads	0.176	0.225	-0.049 (0.313)	0.505	0.443	0.0625 (0.301)
Adequate Ed/Health services	0.477	0.538	-0.061 (0.305)	0.780	0.717	0.0632 (0.221)
Age	37.390	36.250	1.140 (0.819)	36.680	37.990	-1.309 (0.792)
Literate	0.160	0.180	-0.020 (0.032)	0.208	0.155	0.053 (0.035)

Married	0.954	0.954	0.000 (0.012)	0.922	0.957	-0.035** (0.014)
Scheduled tribe	0.712	0.775	-0.063 (0.068)	0.736	0.772	-0.036 (0.074)
Husband age	40.930	39.950	0.978 (0.762)	40.400	40.870	-0.473 (0.713)
Husband literate	0.073	0.086	-0.014 (0.021)	0.093	0.070	0.023 (0.020)
Own house	0.853	0.849	0.004 (0.029)	0.808	0.888	-0.08*** (0.027)
Own farm	0.913	0.909	0.004 (0.031)	0.834	0.876	-0.042 (0.048)
Kutcha home	0.705	0.774	-0.069 (0.049)	0.650	0.669	-0.019 (0.058)
Home has toilet	0.068	0.055	0.013 (0.026)	0.069	0.046	0.023 (0.028)
Observations	27	55		27	54	

Table 4: Conditional estimates of the impact of SEWA

	SEWA Village	Post- intervention	SEWA Village × Post-intervention	R ²
Participates in group programs	-0.007 (0.027)	0.075** (0.035)	0.244*** (0.049)	0.110
In the habit of saving	-0.043* (0.025)	0.018 (0.031)	0.109** (0.043)	0.042
Employed (past three months)	0.029 (0.027)	0.040 (0.026)	-0.004 (0.040)	0.268
Employed in agriculture (past three months)	0.052* (0.026)	0.032 (0.029)	-0.055 (0.039)	0.318
Employed outside agriculture (past three months)	-0.022 (0.016)	0.008 (0.021)	0.051* (0.029)	0.064
Final say: children's schooling	0.004 (0.018)	-0.019 (0.015)	0.047* (0.024)	0.164
Final say: medical decisions	-0.018 (0.017)	-0.028 (0.018)	0.065** (0.027)	0.138
Final say: family-planning	-0.034** (0.012)	-0.050*** (0.015)	0.062*** (0.016)	0.032
Know where to report grievance: Water	0.004 (0.020)	0.110*** (0.027)	0.128** (0.052)	0.109
Know where to report grievance: Roads	0.001 (0.023)	0.154*** (0.034)	0.04 (0.055)	0.075
Know where to report grievance: Electricity	0.014 (0.027)	0.232*** (0.037)	0.089 (0.069)	0.110
Know where to report grievance: Ed/Health	-0.009 (0.029)	0.046 (0.031)	0.081 (0.052)	0.051
Addressed Grievance: Water	0.009 (0.021)	0.100*** (0.025)	0.099* (0.052)	0.083
Addressed Grievance: Roads	0.014 (0.021)	0.153*** (0.031)	0.016 (0.051)	0.058
Addressed Grievance: Electricity	0.013 (0.023)	0.183*** (0.031)	0.068 (0.058)	0.077
Addressed Grievance: Ed/Health	-0.011 (0.025)	0.045 (0.028)	0.067 (0.042)	0.033
Know of Gram Sabha and Panchayat	-0.011 (0.031)	0.011 (0.041)	0.048 (0.054)	0.072
Engage with Gram Sabha and Panchayat	-0.009 (0.007)	-0.007 (0.008)	0.018* (0.011)	0.022
Known anyone who has paid a bribe	-0.017 (0.014)	-0.034** (0.014)	0.051** (0.020)	0.016
Adequate drinking water	-0.027 (0.036)	0.045 (0.034)	0.125** (0.058)	0.176
Adequate electricity	0.004 (0.040)	0.001 (0.036)	-0.008 (0.049)	0.102
Adequate roads	-0.003 (0.004)	-0.009 (0.007)	-0.023 (0.020)	0.935
Adequate facilities for health and education	-0.043 (0.046)	0.150*** (0.048)	0.089 (0.067)	0.145

Notes: (i) Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; (ii) All regressions include block-level fixed effects; (iii) All regressions include the set of control variables described in the text; (iv) N=3205.

Table 5: Preferences for public goods

	Non-SEWA		SEWA	
	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
Sewage and Sanitation	16.38	-15.15	26.20	-16.13
Water	-6.85	5.06	-14.83	-0.46
Transport	-1.58	-4.09	4.94	17.28
Electricity	-6.42	5.27	-5.53	5.30
Education	-1.81	5.53	-2.67	-2.53
Health	1.07	4.54	-3.01	-2.07
Employment	-0.97	-1.16	-4.71	0.23
Exclusion	0.18	..	-0.39	-1.61
ST Concentration	0.3749	0.1891	0.3809	0.1912
Non-ST Concentration	0.0865	0.1500	0.1085	0.1004

Notes: The table lists several public goods/services priorities selected by respondents as the “no. 1 priority for the village.” Figures show differences in public-goods priorities between Schedule Tribe (ST) women and non-ST women across village categories (a positive number indicating greater ST than non-ST preference for prioritizing the particular public good). Concentration figures are Herfindahl indices calculated from the sum of squared fraction of ST and non-ST preferences.

Table 6: Differences in demographic characteristics, game players

	Control	Treatment	Difference
Average Age	32.950	32.604	-0.349 (0.549)
Average Education	1.440	1.416	-0.0252 (0.213)
Average Literacy	0.233	0.313	0.080 (0.035)
Live with husband	0.883	0.937	0.054*** (0.019)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: Summary statistics for all rounds, treatment and control areas

Outcome	Control	Treatment	
		Sewa Members only	Sewa Members and Non-Members
Number of rounds played	6.5	4.6	4.75
Number of players in each round	12	12	15
Fraction of rounds in which cooperation was achieved	51percent	59percent	62percent
Average of payouts per round – Payouts from Nash strategy of contributing 0 in each round	Rs. 6.05	Rs. 31.33 25.45833	Rs. 25.46

Figure 1: Contributions and cumulative payouts per round

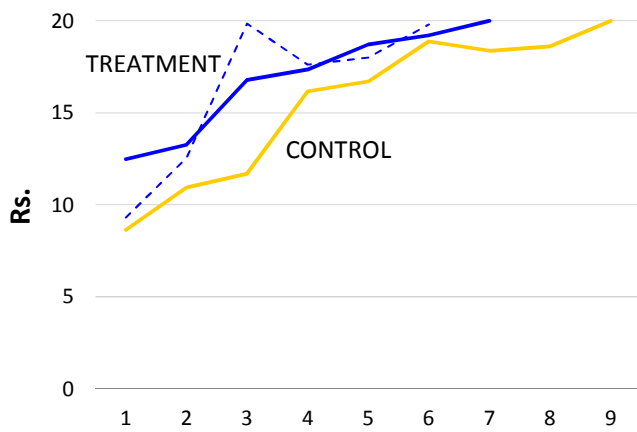


Figure 2: Spreads (i.e. maximum contribution minus minimum contribution) per round

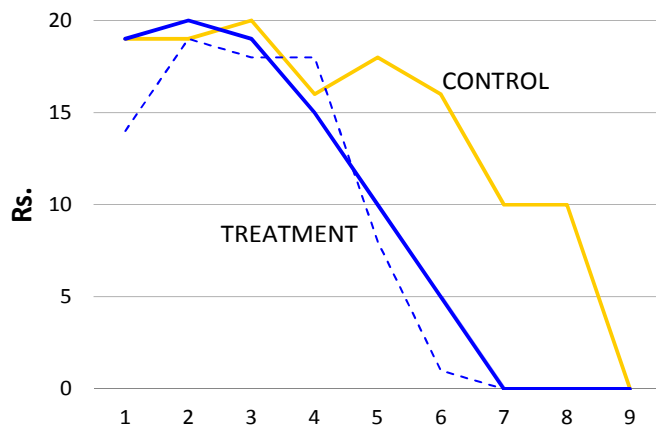


Table 8: Regression results for experimental games: contributions, balances and payouts

	Contribution			Balance			Payouts		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sewa Village and Sewa Member	2.552*** (0.791)	4.175*** (0.917)	3.980*** (0.934)	3.986*** (0.712)	17.524*** (4.333)	17.066*** (4.139)	9.623*** (2.106)	25.988*** (5.604)	25.172*** (5.485)
Sewa Village and Non-Member	2.706*** (0.891)	4.264*** (1.268)	4.382*** (1.233)	2.533 (4.183)	15.645** (5.948)	13.939* (6.718)	8.478 (5.185)	24.299*** (7.479)	22.940** (7.650)
Sewa Member X Lagged net contribution			0.067** (0.030)			0.035 (0.190)			0.162 (0.212)
Sewa Village Non-Member X Lagged net contribution			0.022 (0.065)			0.232 (0.293)			0.258 (0.407)
Lagged net contribution			-0.044 (0.026)			-0.155 (0.161)			-0.234 (0.173)
Threshold		0.015** (0.005)	0.015*** (0.005)		-0.162*** (0.027)	-0.158*** (0.025)		-0.131*** (0.032)	-0.125*** (0.029)
Round		1.484*** (0.139)	1.427*** (0.138)		1.343* (0.711)	0.858 (0.780)		4.095*** (0.740)	3.516*** (0.766)
July2011		-1.792* (0.844)	-2.471** (0.928)		-43.182*** (5.609)	-45.199*** (6.203)		-47.657*** (6.625)	-50.864*** (7.001)
Age		-0.005 (0.025)	-0.004 (0.024)		0.107 (0.077)	0.106 (0.083)		0.098* (0.046)	0.099* (0.052)
Literate		0.041 (0.443)	0.093 (0.417)		-0.129 (0.546)	-0.010 (0.626)		-0.194 (0.458)	0.023 (0.370)
R-squared	0.040	0.355	0.362	0.232	0.394	0.403	0.321	0.417	0.431
N	860	860	860	860	860	860	860	860	860

Standard errors in parentheses. All regressions include village-level fixed-effects. Intercepts and day dummies are included but not reported. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: Regression results for experimental games: gap and net payouts

	Gap		Net payouts			
	(10)	(11)	(12)	(13)	(14)	(15)
Sewa Village and Sewa Member	1.071*** (0.353)	4.718*** (0.731)	4.435*** (0.644)	6.639*** (1.427)	21.622*** (4.942)	20.991*** (4.788)
Sewa Village and Non-Member	1.498 (0.924)	4.894*** (0.972)	5.012*** (0.916)	5.340 (4.646)	19.835** (6.658)	18.293** (7.117)
Sewa Member X Lagged net contribution			0.065** (0.028)			0.098 (0.198)
Sewa Village Non-Member X Lagged net contribution			0.007 (0.068)			0.246 (0.348)
Lagged net contribution			-0.065** (0.024)			-0.193 (0.164)
Threshold		-0.037*** (0.006)	-0.035*** (0.005)		-0.146*** (0.029)	-0.141*** (0.026)
Round		0.681*** (0.194)	0.531** (0.183)		2.754*** (0.704)	2.226** (0.753)
July2011		-6.178*** (1.172)	-7.064*** (1.021)		-45.071*** (6.060)	-47.668*** (6.518)
Age		-0.002 (0.022)	0.000 (0.020)		0.101 (0.059)	0.101 (0.066)
Literate		-0.233 (0.564)	-0.167 (0.530)		-0.135 (0.215)	0.032 (0.279)
R-squared	0.028	0.116	0.131	0.294	0.410	0.421
N	860	860	860	860	860	860

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