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Abstract

Self-help groups (SHGs) are the most common form of microfinance in India. We provide evidence that SHGs, composed of women only, undertake collective actions for the provision of public goods. Using a theoretical model, we show that an elected official, whose aim is to maximise re-election chances, would exert higher effort in providing public goods when private citizens undertake collective action and coordinate their voluntary contributions towards the same goods. This effect occurs although government and private contributions are assumed to be perfect substitutes. Using first-hand data on SHGs in India, we test the predictions of the model and show that, in response to collective action by SHGs, local authorities tackle a larger variety of public issues, and are more likely to tackle issues of interest to SHGs.

JEL Classification: D70, G21, H42

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Non-Technical Summary

A type of financial intermediary for the rural poor that has gained prominence in India in recent years are *self-help groups* (SHG), which are typically set up by non-governmental organisations to help the SHG members borrow and save. At the outset, SHG members pool their savings to create a common fund and give out small loans to one another. At a later stage, SHGs are able to open savings with commercial banks and apply for loans. By 2012, about 103 million households in India had at least one member in an SHG.

In this paper, we study the long-term, non-financial impact of SHGs on the villages in which they are based. Using first-hand date collected in the Indian state of Odisha, we provide evidence of women-only SHGs undertaking collective action for the provision of public goods -- most notably on issues relating to public infrastructure, alcohol consumption and forestry -- starting on average 3 years after their inception.

We also document a change in the behaviour of the ward-level representative of the village government (the *Gram Panchayat*) following the introduction of SHGs within villages. The representative's main responsibility is to communicate the ward's problems and needs to public officials. We find that these representatives tackle an increasing variety of public issues, and tackle issues that SHGs consider more important once these groups begin to undertake collective action.

By exploiting the variation in the timing of the introduction of SHGs in different villages in our study area, and using econometric methods based on the concept of instrumental variables, we are able to provide evidence that the link between collective action by SHGs and the increased effort in public good provision by ward-level representatives is causal.

Using the method of randomised control trials, a number of academic studies have been conducted recently to investigate the economic and social impact of access to microfinance on households in the short-term (two or three years following its introduction). This paper is similarly concerned with the impact of a type of microfinance, but our focus is its social impact at the community-level and we are able to assess long-term effects (up to 13 years after the creation of SHGs).

To explain why the ward-level representative would increase effort in response to collective action by SHG members, we use game theory to model the strategic behaviour of village members and their elected official. We assume in the model that (i) the elected official's objective is to maximise his re-election chances, which depends on the welfare of his electorate during his tenure; and (ii) the introduction of SHGs reduces the cost of collective action for its members. We show that the marginal value of the official's effort is higher when the village members undertake collective action and therefore, if the creation of SHGs enable women to be collectively organised, he would exert higher effort in addressing issues of interest to them.

Our theory, coupled with our empirical findings show that government provision of public goods and collective action by individuals may act as complements due to strategic decisions by the individuals concerned, even if their respective contributions are perfect substitutes.

1 Introduction

Self-Help Groups (SHGs) are the most common form of microfinance in India. By March 2012, about 103 million households had a member in a SHG (NABARD, 2013). Their primary aim is to help the poor to save and borrow. At the outset, SHG members pool their savings to create a common fund and give out small loans to one another. At a later stage, SHGs are able to open savings accounts with commercial banks and apply for loans. Because of some features of their functioning, such as the high frequency of meetings and the mutual trust necessary for their stability, SHGs can impact the lives of their members beyond the mere financial sphere.

We study the long-term, non-financial impact of an SHG program that focuses on women only. Using first-hand data collected in the Indian state of Odisha, we document how collective actions undertaken by SHGs impact the variety of public goods that the Gram Panchayat - which is the lowest official authority - deals with. In our research area, each Gram Panchayat is divided into several wards. A representative, known as *ward member* is elected in each of those wards. He is the official spokesperson of the villagers: his main responsibility is communicating the ward's problems and needs to the officials in charge at a higher administrative level, i.e. to officials who are senior to him. The ward member is the only *official* appointment for these duties. Yet, we find evidence that SHG members undertake *collective actions* that de facto overtake or complement the work of the ward member. They visit higher officials as well, or intervene directly to solicit a solution for a variety of problems affecting their ward. We show that these collective actions impact the ward member's choices: it becomes more likely that he starts tackling public goods that SHGs consider important.

Three recent papers - Banerjee et al. (2013), Crépon et al. (2014), and Angelucci et al. (2014) - assess the impact of microfinance programs that provide loans through group lending. Their results are strikingly similar for most economic outcomes, but diverge for the social ones. Banerjee et al. (2013) and Crépon et al. (2014) do not find significant effects on women empowerment in India and Morocco, respectively.[1] But, Angelucci et al. (2014) document a strengthening of women's

[1] In Morocco most borrowers are men. For this reason, as noted by the authors, the limited effect on women

decision-making power in the household. These studies focus on the short-term effects, i.e. within 24 months after providing access to microfinance.[2]

In contrast with these studies, we focus on a different social outcome. Rather than within-household decisions, we consider the impact on local governance of actions undertaken by women as a group. We believe the contribution of our findings is twofold. First, to the best of our knowledge, ours is the first paper assessing the long-term effect of microfinance groups on social outcomes (up to 13 years after their creation). Our data suggest that considering such a long time span is crucial since, in our sample, an average SHG undertakes collective actions for the first time after 3 years of weekly meetings only. Second, our results put forward how microfinance can also be used as a political economy mechanism to improve the lives of the poor.

In September 2010, we interviewed all SHGs created by the NGO PRADAN (Professional Assistance for Development Action) in the Mayurbhanj and Keonjhar districts of rural Odisha. PRADAN's SHG program aims at providing financial intermediation and does not have an explicit socio-political agenda.[3] We asked the SHG members what kind of problems they had faced in their ward and whether they had tried to solve them. Some groups merely discussed problems during their meetings, but others undertook collective actions to tackle them.

We also interviewed the ward members elected in the past 20 years (1992, 1997, 2002 and 2007). Their main focus is on the major responsibilities of the Gram Panchayat: public infrastructure and welfare schemes.[4] But we provide evidence that the range of problems ward members take care of is also influenced by observing the collective actions undertaken by SHGs.

To explain these observations, we propose a simple theoretical model in which local public

empowerment was largely expected.

[2]Banerjee et al. (2013) resurveyed the households after three years. However, at that time, the control group had access to microfinance as well. The control group had larger loans, and was treated for a longer period, but these circumstances "[...] may limit power to detect differences in the social outcomes at the community level." (Banerjee et al., 2013, pg. 28)

[3]In contrast, the Grameen Bank in Bangladesh has a clear social development agenda. Members are required to obey *16 Decisions* which have a clear social connotation. For example, Decision 7 states: "We shall educate our children and ensure that they can earn to pay for their education."

[4]Welfare schemes are governmental programs aiming at helping disadvantaged parts of the population. Among other programs, it includes Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), and Indira Gandhi National Old Age Pension Scheme (IGNOAPS).

goods may be provided through voluntary contributions by community members and effort by an elected official. The official, whose effort is unobservable, is incentivised by the fact that his chance of future re-election is increasing in the present welfare of community members. We show that if the community members undertake collective action – more precisely, can commit to making an efficient level of contribution rather than play the Nash equilibrium – then the official also provides a higher level of effort in equilibrium.

Thus, although the contributions by the official and the community members are substitutes in the technology for providing public goods, they behave as strategic complements in equilibrium. The simple intuition behind the result is that collective action by the community increases the marginal effect of the official's effort on their welfare which, in turn, implies that the official's optimal level of effort is higher under collective action.

In the context of the SHGs setup by PRADAN, the theoretical model has the following implication: to the extent that setting up SHGs made it easier for women in the PRADAN villages to undertake collective action regarding public issues that concerned them, the ward member should increase his efforts in addressing the same issues.

We test the prediction. The information we collected on ward members allows us to construct ward-level panel data over four elections. To identify the impact of collective actions undertaken by SHGs, we use an instrumental variables approach that employs the variation induced by the creation of SHGs. To identify a causal effect, the creation of SHGs should be uncorrelated with determinants of future public good provision. After including ward fixed effects, the assumption underlying our approach is that the creation of SHGs is not correlated with pre-existing differences across wards. We assess the plausibility of this assumption using the 1991 Census data and our information on the period before the first SHGs were created. We show that the first villages in which PRADAN created SHGs have socioeconomic characteristics comparable to those in which SHGs were created later.

Our empirical results confirm the prediction of our model. We find that ward members deal with, on average, 1.5 extra public goods after SHGs start undertaking actions. In particular, they

are 29% more likely to deal with alcohol issues, 35% more with forestry issues and 31% more with school problems, all of which are issues in which SHGs are particularly interested.

Our work is related to several strands of the literature. A number of studies look at the social implications of microfinance programs. Chowdhury et al. (2004) discuss why, in evaluating the impact of microfinance programs, non-client beneficiaries ought to be considered. Feigenberg et al. (2013) provide evidence that the frequency of meetings is a determinant of long-run increases in social interaction. Desai and Joshi (2014) show that SHG membership makes socially disadvantaged women more likely to engage in community affairs; and Deininger and Liu (2009) find positive impacts on female empowerment of SHG membership. We describe how the social behavior of SHGs can influence the governance of rural Indian communities.

Several papers provide evidence that men and women have diverging preferences for some public policies (Lott and Kenny, 1999; Edlund and Pande, 2002; Edlund et al., 2005). Still, in many countries, women's preferences hardly find their way into the policy-making agendas. Some governments have imposed political reservations to alter policy choices in favor of women. Chattopadhyay and Duflo (2004) have shown the significant effect of these reforms in India. We add to this literature by exploring an alternative channel through which the preferences of women can sway political decisions, without resort to overt policy controls.

Our theoretical model is related to a long literature which explores the relation between government provision of, and voluntary contributions towards public goods, going back to Warr (1982), Roberts (1984), and Bergstrom et al. (1986). An important finding in this literature is that increases in government provision can cause crowding out of private contributions. Our theoretical model shows, in a setup similar to the ones used in this literature, that collective action by private citizens in contributing to a public good can incentivise an elected official to increase effort in providing the same. Thus, private provision and government provision of public goods can be complementary.

The paper is organized as follows. In Section 2 we describe our data set, the ward structure and the collective actions undertaken. In Section 3, we describe a simple model suggesting the predictions that we test later on. Section 4 links the theory with the empirics, which are then

provided in Section 5. Section 6 concludes.

2 Background Information

2.1 Data Set

Data collection was assisted by our partner NGO, named PRADAN. Its main mission is the improvement of forest-based livelihoods and natural resource management of socioeconomically disadvantaged people. It pioneered the creation of SHGs (consisting entirely of women) as an instrument to achieve its mission (PRADAN, 2005).

In 2006, Baland, Somanathan and Vandewalle surveyed all PRADAN SHGs created in the Mayurbhanj and Keonjhar districts of Odisha, independent of whether the groups were still actively meeting or not. They collected information on 532 SHGs and 8,599 women who, at some point, belonged to these groups (Baland et al., 2008). In the autumn of 2010, we complemented this data set in two ways. First, we revisited these SHGs to gather information on the collective actions they undertook. Second, we performed a ward survey to collect data on the characteristics and activities of ward members. As PRADAN started working in Odisha in 1998, and as we needed information dating back to the period before the creation of the first SHG, we interviewed the ward members elected in 1992, 1997, 2002 and 2007.[5] We asked them to recall the types of issues they dealt with, i.e. the type of issues for which they visited a higher official or intervened directly in the ward.[6]

In total, we gathered information on 425 SHGs, and we have complete information on 441 ward members, covering 108 villages and 141 wards.[7] Wards are in most cases smaller than villages. On average, there are 1.3 wards per village. Villages and wards coincide for 75% of the villages in

[5] Elections take place every 5 years. Ward members can be re-elected.

[6] To avoid a recall bias - which occurs if ward members elected in 1992 remember less of their interventions than those elected in 2007 - we gathered information as follows: first, we conducted focus group discussions in a subset of wards to list (as many as possible) ward problems. Based on this information, we defined the six broad categories that are described in Appendix A (for example, problems related to a well or a road are both categorised as "public infrastructure"). Second, when interviewing the ward members, we first asked the type of issues they dealt with as an open question and then we proposed the categories they had not mentioned.

[7] We were not able to resurvey 21 villages (62 SHGs) because of social tensions created by a private mining firm (the roads to those villages were blocked). Another 45 groups that no longer meet refused to be re-surveyed. 34 of them are based in wards where other SHGs are still meeting. Thus, for those we obtained all the information needed for our analysis.

our data set. Wards are larger than villages for 8 small villages only. These 8 villages belong to 4 different wards.

2.2 Ward Structure

In rural India, the lowest official authority is the Gram Panchayat. It is composed of 5-15 contiguous villages. The 73rd Amendment Act 1992 of the Constitution of India empowers the State Legislature "*to endow the Panchayats with the power and authority necessary to prepare the plans and implement the schemes for economic development and social justice*". The main responsibilities passed onto the Gram Panchayat are managing public infrastructure and identifying villagers who are entitled to welfare schemes (Xaxa, 2010).

Each Gram Panchayat is divided into wards and is governed by one Sarpanch, a Naib-Sarpanch and several *ward members*. One ward member (hereafter WM) is elected in each ward. WMs have the right to access the records of the Gram Panchayat, to question any official about its administration, and to inspect the actions it undertakes. Their main responsibility is informing government officials in charge about the ward's problems and needs. Apart from the Sarpanch, they can also approach higher authorities at the block or district level. WMs do not control financial means that would allow them to intervene without the involvement of higher authorities, unless the intervention is costless. In what follows, we use the general label *higher official* to indicate any government official, who is at a higher administrative level than the WM, and who is endowed with the financial means and power to solve a particular issue (Xaxa, 2010).

Although SHGs are created for financial intermediation, we find evidence that members participate in collective actions that de facto overtake or complement the work of the WM. They either communicate their concerns about a public issue to a higher official, i.e. an official who is senior to the WM; or they intervene directly in their ward. SHGs undertake collective actions as a group, with 11 out of an average 15 members actively involved in the first action.[8]

Apart from SHGs, there are two other bodies active in solving ward problems: some single

[8] A first action typically concerns public infrastructure (33.6%), forestry issues (26.1%) and alcohol problems (21.9%). See Appendix A for a description of the ward level problems.

individuals and some other groups of villagers. We label the latter as *Other Groups*. They consist of villagers who meet on average once a month, for a specific, non-financial reason. Most of them are *forest committees* (69.2%), i.e. groups of people dedicating time and resources to avoid forest exploitation.[9] Some of these committees are created by officials of the forest department (35.4%). 26.6% of Other Groups are known as *village help clubs*. They are formed by young villagers and deal with a wide range of issues related to social violence and public infrastructure. Finally, there are groups formed for cultural activities (3.2%) and farming issues (1.0%). Remarkably, of the 94 Other Groups in our data set, only one consists entirely of women.

We also surveyed a random sample of *Individuals* to obtain information on villagers who joined neither an SHG nor an Other Group.

Table 1 shows the characteristics of WMs, members of SHGs, members of Other Groups and Individuals who dealt with ward problems at least once in the columns (1) to (5). The Other Group members differ from SHG members in several respects: they are mainly men, are more educated and own about 1 acre more of land. SHG members differ from WMs and Individuals: the latter are better educated and own more land. 31% of the WMs are women, but 78% of them are elected thanks to reservations for women.[10] Remarkably, there are few women among the Individuals who dealt with ward problems (2.3%). For this reason, we group men and women in column (5).

Columns (6) to (9) show the characteristics of bodies who never dealt with ward problems. Both SHG members and male Individuals are less educated than their counterparts who dealt with ward problems. Female Individuals are slightly more educated and own more land than SHG members, which suggests that SHGs are formed by the most disadvantaged part of the female population.

[9] As most villages are located close to the forest, households depend on it for cooking and as a source of income (e.g., an important source of income is making leaf plates). An increasing population adds more pressure upon the forest. To prevent excessive deforestation, villagers formed voluntary forest committees. Later, the forest department started supporting existing committees and created new ones. They provide training, supplies and introduce new ways of sustainable exploitation of the forest.

[10] During the period under study, it was imposed that one-third of the seats had to be reserved for women. The reservation of seats is allotted by rotation among the different wards (Xaxa, 2010).

Table 1: Characteristics of WMs, members of SHGs, members of Other Groups and Individuals

	Bodies who dealt with ward problems					Bodies who never dealt with ward problems			
	Ward members		SHGs	Other Groups	Individuals	SHGs	Other Groups	Individuals	
	Female	Male						Female	Male
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
# of groups	-	-	388	91	-	37	3	-	-
# of members	138	303	6,299	734	132	567	23	79	765
Women (%)			100.0	13.4	2.3	100.0	17.4		
Education level (years)	5.8	7.4	2.6	7.6	9.0	1.4	7.2	3.3	4.8
Can read and write (%)	76.1	89.4	30.5	83.0	96.2	16.4	87.0	36.7	57.9
Land (acres)	2.1	2.5	1.7	2.6	3.3	1.7	2.6	2.6	1.8
Number of children	2.7	3.0	2.6	2.6	2.8	2.9	2.1	1.9	2.6
Age (years)	40.1	46.9	35.5	41.0	47.7	35.4	34.8	37.0	42.4
Caste category: ST (%)	65.9	74.9	62.9	67.3	64.4	82.5	56.5	77.2	66.5
Caste category: SC (%)	14.5	4.6	9.3	4.3	4.5	1.4	17.4	1.3	6.7
Caste category: OBC (%)	19.6	19.8	26.5	27.9	28.8	15.5	26.1	21.5	26.7
Caste category: FC (%)	0.0	0.7	1.3	0.5	2.3	0.6	0.0	0.0	0.1

2.3 Ward Problems

Table 2 shows, for each issue, the percentage of WMs and SHGs that tried to solve a problem either by visiting a higher official or by intervening directly.[11] A brief explanation of the different problems is given in Appendix A.

Table 2: Aim of collective actions of WMs and SHGs

	% that dealt with the issue	
	WMs	SHGs
	(1)	(2)
Public infrastructure	**81.9**	53.7
Welfare schemes	**65.1**	16.5
Alcohol problems	12.9	**59.8**
School problems	12.5	**16.5**
Forest issues	33.8	**55.1**
Other	4.8	3.5
Average number of different issues (conditional on at least one)	2.2	2.3
Number of observations	441	425

[11] SHG Members also provided mutual help in about 9 percent of the SHGs. They provided assistance when a member needed medical help, or when a funeral had to be organised. They also intervened when a conflict took place in a member's household. WMs do not get involved in these activities. Therefore, we do not consider those in the remainder of the paper.

WMs are more likely to deal with public infrastructure and welfare schemes than SHGs. This is not surprising since these are the main responsibilities of the Gram Panchayat. Compared to WMS, SHGs are more likely to deal with alcohol and school problems, and forest related issues. The focus on alcohol issues is in line with the findings of a wide literature on the topic.[12] Some SHGs visited higher officials to request the suspension of alcohol licenses. Others intervened directly by organizing anti-alcohol campaigns or trying to dissuade households from producing alcohol. This is quite interesting since anecdotal evidence suggests that women consider alcohol consumption as a prerogative of men; hence, they rarely undertake legal actions, even in case of domestic violence or abuse. Indeed, we could not find any woman undertaking an action alone. School problems are mainly related to the provision of free midday meals, sanitation and teacher quality. The interest in these issues is in line with the common finding that women generally spend more time and resources on family welfare than men.[13] Furthermore, in our survey, SHGs are responsible for providing midday meals at schools in 23.2% of the villages. The focus of SHGs on forestry issues is not surprising either, as the livelihood of many households depends on forestry. Moreover, 29.7% of the SHGs received training from PRADAN to improve their forest-based sources of income.

2.4 The Evolution of WMs' Activities

We are interested in studying whether the collective actions undertaken by SHGs impacts the choices of WMs. Unfortunately, we cannot measure changes in the productivity of WMs, as we only know the SHGs' perception about how successful he was for each intervention.[14] But we do know whether he tackled an issue or not and this is what we exploit. Table 3 shows the percentage

[12] The literature shows three main results. First, households realize that alcohol consumption reduces the budget available for primary expenses (Mishra, 1999). According to Banerjee and Duflo (2007) alcohol ranks among the first goods that poor families would like to eliminate from their consumption bundle if they had more self-control. Secondly, in India, men are 9.7 times more likely than women to regularly consume alcohol (Neufeld et al., 2005). Finally, there is strong evidence that alcoholism triggers violence against women. Rao (1997) and Panda and Agarwal (2005) show that the risk of wife abuse increases significantly with alcohol consumption. Babu and Kar (2010) find that domestic violence is pervasive in Eastern India, which includes Odisha. They show that alcohol consumption is an important risk factor for physical, psychological and sexual violence against women.

[13] See Anderson and Baland (2002) and Duflo (2012).

[14] See Section 5.4 for a qualitative analysis of WMs' productivity.

of WMs dealing with each issue in their ward. WMs are classified depending on whether their mandate finished before the first SHG was created in the ward (column (1)) or after (column (2)). These simple descriptive statistics document a sharp increase for almost all the problems.

Table 3: Problems WMs dealt with, before and after the creation of SHGs

	% of WMs dealing with an issue in their ward			
	before the first SHG was created	once SHGs are present		
		all	before SHGs undertake actions	since SHGs undertake actions
	(1)	(2)	(3)	(4)
Public infrastructure	75.2	84.4**	78.3	86.5***
Welfare schemes	37.2	75.6***	63.9***	79.8***
Alcohol problems	2.5	16.9***	1.2	22.4***
School problems	5.0	15.3***	2.4	19.8***
Forest issues	22.3	38.1***	16.9	45.6***
Other	3.3	5.3	4.8	5.5
Average number of different issues (conditional on at least one)	1.7	2.4***	1.8	2.6***
Number of observations	121		83	237

Significance of the difference relative to column (1) *** p<0.01, ** p<0.05, * p<0.1

This analysis can be refined by taking into account the fact that SHGs do not undertake collective actions from the very start of their existence. SHGs are created for financial intermediation, and not for public good provision. Furthermore, the PRADAN SHG program has no explicit socio-political agenda. Indeed, on average, an SHG undertakes the first collective action only after about three years of weekly meetings.[15] If the activities of the WMs are influenced by the collective actions of SHGs, we might observe a change only when SHGs become active. In other words, the mere creation of an SHG might not matter. For this reason, we split the time frame *after* the creation of SHGs. Table 3 reports the percentage of WMs who deal with a problem depending on whether his mandate finishes after the creation of the first SHG but before an SHG undertakes

[15]Mishra (1999) describes the process leading SHGs to different forms of cooperation as a three-stage evolution over time. In the first stage, group members have a minimum level of awareness and need to shed their prejudices. In the next stage, groups experience pressure from both outside and inside that helps the emergence of a group leader and shapes internal norms. Groups reach the third stage when they agree on their objective. They start functioning as a team, recognize common problems (both economic and social) and undertake collective actions. Following this reasoning, we believe that groups deal with elaborated non-financial issues only when they reach a minimum level of financial stability.

collective actions in his ward (column (3)) or after the first SHG does so (column (4)). For most issues, we observe an incremental change after the creation of the first SHG in the ward, but the increase is statistically significant only after the first SHG undertakes action.

Section 3 provides a simple theoretical model, that formalizes why and if WMs have incentives to deal with a different set of public goods as a response to the collective actions of SHGs.

3 A Model of Public Goods Provision and Collective Action

Imagine a community consisting of n individuals. An individual i derives utility from a private good denoted by x_i and a set of public goods $y_1,..,y_k$ enjoyed by all community members. We represent the utility of an individual i as follows:

$$U_i(x_i, y_1, .., y_k) = (x_i)^{\alpha_i} \prod_{j=1}^{k} (y_j)^{\beta_i}$$

where $\alpha_i, \beta_i \in (0,1)$ for $i = 1,..,k$.

The private good is generated according to the production function $f(l_{xi}) = \omega l_{xi}$ where l_{xi} is the amount of time devoted to private goods production. (Here, ω can represent productivity in home production or the wage that an individual receives from providing labour in the labour market, which is subsequently used to purchase private goods). Public good j is generated according to the production function $h(l_{yj}) = \theta_j l_{yj}$ where l_{yj} is the total labour contribution by all community members in the production of public good j. (Here, θ_j is an efficiency parameter in public goods production). Each individual has an endowment of 1 unit of labour time that can be used either for the production of private goods or the provision of public goods.

This setup is similar to that of Bergstrom et al. (1986), who investigate how voluntary contributions to a public good in a group of individuals is affected by the distribution of wealth and by the centralised provision of the public good financed by taxes. In the following we will investigate how the efforts of an elected official – who gains from raising the utility of his constituents – in the provision of the public good is affected by the presence or absence of collective action within the community. We will show that, paradoxically, the elected official makes a greater contribu-

tion to the provision of public goods when the community members coordinate their efforts in contributing to the same, as compared to when they do not.

Subsequently, we will look at the case where different subgroups within the community care about different public goods, and show that when one of the groups undertakes collective action with regard to its preferred public good, the elected official shifts his efforts to increase his contribution towards the same good.

3.1 The Case of Homogeneous Preferences

The idea underlying our theoretical argument can be illustrated with a simple setup where there is a single public good and all members of the community have the same preferences regarding private good consumption and the public good. We write the utility of person i as

$$U(x_i, y) = (x_i)^{\alpha} (y)^{\beta}$$

The community can elect an official whose job will be to address the public good issues faced by the community members. We assume that if he contributes l_m units of labour to the provision of the public good, this is equivalent to ml_m units of labour contribution by any other community member, where $m > 0$ (His level of effectiveness may be different from that of other community members because he acts in an official capacity). Therefore, we write the total contribution to the public good as

$$L = ml_m + \sum_{i=1}^{n} l_i$$

where l_m is the amount of labour provided by the elected official.

The elected official receives a remuneration ω_m for his official work. His labour contribution cannot be contracted upon. However, his chances of re-election will depend on how well he has served his constituents in the past. His tenure lasts for one period following which he has to contest elections. His probability of being successful at the elections is given by $\pi(\mathbf{1}_n'\mathbf{U})$ where $\mathbf{U}$ is a vector describing the utility achieved by each community member in the preceding period and $\mathbf{1}_n$ is a vector of ones of dimension n. We assume that the probability function is linear over the

relevant range of utilities to ensure that the official's incentives are unaffected by the *level* of utility achieved by community members:

Assumption 1. $\pi'(.) > 0$ *and* $\pi''(.) = 0$ *in the interval* $\left[n(\alpha\omega)^{\alpha}(\beta\theta)^{\beta}\left(\frac{n}{\alpha n+\beta}\right)^{\alpha+\beta}, n(\alpha\omega)^{\alpha}(\beta\theta)^{\beta}\left(\frac{m+n}{\alpha+\beta}\right)^{\alpha+\beta}\right]$

The interval in Assumption 1 is chosen on the basis of the minimum and maximum utility that community members can achieve in the game. His utility in the current period is given by

$$U_m(x_m, y) = (x_m)^{\alpha_m}(y)^{\beta_m}$$

where x_m denotes the level of consumption of his private good, and $\alpha_m, \beta_m \in (0,1)$. We assume, for simplicity, that his utility gain from re-election is equal to a constant Ψ. The term Ψ may include not only the financial reward from re-election but also the utility derived from the prestige associated with the position and the added benefits of political capital.[16]

Before the elected official chooses his labour contribution in the provision of the public good, the community decides whether they will undertake 'collective action'; i.e. whether they will choose their own labour contribution towards the public good collectively or individually. 'Collective action' involves a one-time utility cost of C for each community member (this may be thought of as the cost of organisation, negotiation, setting up an enforcement mechanism, etc.) Specifically, the timing of events within the game is as follows.

1. Members of the community decide whether or not they will undertake collective action.

2. The elected official chooses his labour contribution towards the public good and his own private good.

3. If the members of the community invested in collective action at stage 1, they decide upon their labour contribution collectively; otherwise they make their labour contribution individually.

[16] A alternative approach to modelling the official's re-election incentive would be to derive his expected utility from being re-elected from a repeated game. While this alternative approach can provide additional insights, it is beyond the scope of the present paper. Our approach would be a reasonable simplification if the official's time horizon for utility maximisation extends only to the next election.

At each stage of the game, the individuals have knowledge of what has happened before. When the community members decide upon their labour contribution 'collectively', we assume that their contributions are efficient and symmetric. When they decide upon their labour contributions individually, we assume that this results in the symmetric Nash equilibrium of the subgame.

To predict the outcome in this model, we first compute, for a given contribution by the elected official, the utility level that each community member would achieve in the absence and presence of collective action.

3.1.1 Equilibrium in the Absence of Collective Action

First, we derive the equilibrium level of contributions within the community in the absence of collective action. Let us denote by l_{yj} the labour contribution of person j to the public good. Let us denote by l_{xj} the labour contribution of person j to the private good. Then, we can write the utility to person i as

$$U_i = (\omega l_{xi})^{\alpha} \left(m\theta l_m + \sum_{j=1}^{n} \theta l_{yj} \right)^{\beta}$$

In the absence of coordination, each individual will equate marginal utility between the private good and the public good. Thus, we obtain

$$\alpha\omega (x_i)^{\alpha-1} (y)^{\beta} = \beta\theta (x_i)^{\alpha} (y)^{\beta-1} \tag{1}$$

where $x_i = \omega l_{xi}$ and $y = m\theta l_m + \sum_j \theta l_{yj}$. In the case of a symmetric Nash equilibrium where each community member makes a labour contribution of l_y to the public good, we have $y = m\theta l_m + n\theta l_y$ and $x_i = \omega(1 - l_y)$. Substituting for y and x_i in (1) using these expressions, we obtain

$$l_y = \frac{\beta - \alpha m l_m}{\alpha n + \beta} \tag{2}$$

$$\implies y = \beta\theta \left(\frac{m l_m + n}{\alpha n + \beta} \right) \text{ and } x_i = \alpha\omega \left(\frac{m l_m + n}{\alpha n + \beta} \right) \tag{3}$$

So, the utility of each community member is given by

$$U(x_i, y) = (\alpha\omega)^{\alpha}(\beta\theta)^{\beta}\left(\frac{ml_m + n}{\alpha n + \beta}\right)^{\alpha+\beta} \tag{4}$$

3.1.2 Equilibrium in the Presence of Collective Action

Next, we consider the labour allocation by the community members under collective action. If they implement an efficient contract, their allocation of labour should solve the following optimisation problem

$$\max_{(l_{xj}, l_{yj})} \sum_{j=1}^{n} \lambda_j \left(\omega l_{xj}\right)^{\alpha} \left(\sum_{k=1}^{n} \theta l_{yl} + m\theta l_m\right)^{\beta}$$

for some Pareto weights $\lambda_1, .., \lambda_n$. Using the first-order condition, we obtain

$$\lambda_i \alpha\omega (x_i)^{\alpha-1} y^{\beta} = \beta\theta \sum_{j=1}^{n} \lambda_j \left(x_j\right)^{\alpha} y^{\beta-1} \tag{5}$$

where $x_i = \omega(1 - l_{xi})$ and $y = m\theta l_m + \theta \sum_{j=1}^{n} l_{yj}$. In the case of a symmetric contract where the Pareto weights are equal and each community member makes the same labour contribution of l_y to the public good, we have $y = m\theta l_m + n\theta l_y$ and $x_i = x = \omega(1 - l_y)$. Substituting for x and y in (5) using these expressions, we obtain

$$l_y = \frac{\beta n - \alpha m l_m}{n(\alpha + \beta)} \tag{6}$$

$$\implies y = \beta\theta\left(\frac{ml_m + n}{\alpha + \beta}\right) \text{ and } x = \alpha\omega\left(\frac{ml_m + n}{\alpha n + \beta n}\right) \tag{7}$$

So, the utility of each community member is given by

$$U(x_i, y) = (\alpha\omega)^{\alpha}(\beta n\theta)^{\beta}\left(\frac{ml_m + n}{\alpha n + \beta n}\right)^{\alpha+\beta} \tag{8}$$

3.1.3 Why Collective Action Makes a Difference

For a given level of contribution to the public good by the elected official, the community members are at least as well-off when they undertake collective action as compared to their utility under the symmetric Nash equilibrium. This is true by construction as the contract under collective action is symmetric and efficient. However, whether they are ultimately better-off depends on the labour

response of the elected official to such a decision. To address this question, we proceed as follows.

Using (4) and (8), we can determine how an increase in labour contribution by the elected official towards the public good affects the utility of community members in the presence and absence of collective action. Differentiating (4) and (8) with respect to l_m, we obtain

$$\frac{dU_i}{dl_m} = \quad (\alpha+\beta)(\alpha\omega)^{\alpha}(\beta\theta)^{\beta}\left(\frac{ml_m+n}{\alpha n+\beta}\right)^{(\alpha+\beta-1)}\left(\frac{m}{\alpha n+\beta}\right) \text{ in the absence of collective action} \tag{9}$$

$$\frac{dU_i}{dl_m} = \quad (\alpha+\beta)(\alpha\omega)^{\alpha}(\beta n\theta)^{\beta}\left(\frac{ml_m+n}{\alpha n+\beta n}\right)^{(\alpha+\beta-1)}\left(\frac{m}{\alpha n+\beta n}\right) \text{ in the presence of collective action} \tag{10}$$

Comparing the expressions on the right-hand sides of (9) and (10), we can establish the following lemma.

Lemma 1. *The marginal utility of the elected official's effort is higher when the community members undertake collective action, as compared to when their labour contributions constitute a Nash Equilibrium if and only if* $\frac{1}{n^{1-\beta}} > \frac{\alpha+\beta}{\alpha n+\beta}$.

Proof. See Appendix B. □

The condition in Lemma 1 is satisfied for a large range of values for α, β and n. For example, if $\alpha = \beta = 0.5$, the condition is satisfied for all $n > 1$.

3.1.4 The Elected Official's Optimal Choice

Using Lemma 1, we can investigate how the community's decision about whether or not to undertake collective action affects the elected official's labour choice at the second stage of the game. The official's optimisation problem can be written as follows:

$$\max_{l_m} U(x_m, y) = (x_m)^{\alpha_m}(y)^{\beta_m} + \pi\left(\mathbf{1}_n'\mathbf{U}\right)\Psi$$

subject to

$$\begin{aligned} x_m &= \omega_m + \omega(1 - l_m) \\ y &= n\theta l_y + m\theta l_m \\ U_i &= U_{eq} \text{ for } i = 1, .., n \end{aligned}$$

where U_{eq} is given by (4) in the absence of collective action and by (8) in the presence of collective action; in addition, l_y denotes the equilibrium labour contribution towards the public good by each community member, given by (2) in the absence of collective action and by (6) in the presence of collective action, and $\mathbf{U}' = (U_1, U_2, .., U_n)$.

From the first-order condition to the elected official's optimisation problem, we obtain, assuming an interior solution,

$$\alpha_m \omega (x_m)^{\alpha_m - 1} (y)^{\beta_m} = \beta_m m\theta (x_m)^{\alpha_m} (y)^{\beta_m - 1} + \Psi \pi' (.) \sum_{i=1}^{n} \frac{dU_i}{dl_m} \tag{11}$$

where $\pi'(.)$ is the derivative of the probability function $\pi(.)$. This equation is identical to that obtained for ordinary community members except for the last term which derives from the fact that any effort by the elected official in improving the community's access to the public good affects his re-election chances.

We see from Lemma 1 that, for reasonable parameter values, the marginal utility of the elected official's effort, $\frac{dU_i}{dl_m}$ (which affects his re-election chances) is higher when the members of the community undertake collective action, compared to when they play a Nash equilibrium. On the other hand, when the community members undertake collective action, they will also allocate a higher level of effort in the delivery of the public good for any given level of effort applied by the elected official and this provides the elected official an incentive to free-ride on public good delivery. These two effects go in opposite directions, and so the net effect on the elected official's effort is ambiguous.

If the elected official does not directly care for the public good, i.e. $\beta_m = 0$, then the first effect dominates and this causes the elected official to provide higher effort in the delivery of the public

good. If $\beta_m > 0$, the first effect will dominate if Ψ is sufficiently large; i.e. if he cares enough about being re-elected and/or the benefits of holding office are sufficiently high. These results are summarised in the following proposition.

Proposition 1. *If the conditions in Lemma 1 and Assumption 1 hold and the elected official has no intrinsic preferences regarding the provision of the public good, then his labour contribution towards the public good is higher under collective action. If the official cares directly about the public good, then his labour contribution towards the public good is higher under collective action if Ψ is sufficiently large.*

Proof. See Appendix B. □

Thus, assuming the conditions in Proposition 1 hold, the elected official will provide a higher labour contribution towards the public good if the community undertakes collective action at the first stage of the game. It follows that the community will have a higher level of utility when they undertake collective action. However, their net gain from collective action will also depend on the fixed cost C incurred in preparing to take such action, as discussed at the beginning of this section. As the cost may vary across communities, some of them may find it in their interest to form collective action groups while others may not. We discuss this issue in more detail in Section 4.

3.2 The Case of Heterogeneous Preferences

Thus far, we have assumed that all members of the community have the same preferences vis-a-vis their own private consumption and the provision of the public good. In this section, we consider the setting where the community is composed of distinct groups, which differ in terms of their preferences regarding public goods. We consider how the elected official's decisions are affected when one of the groups organises and engages in collective action to improve the provision of the public good. We show that the outcome is similar to that obtained in the preceding section.

For ease of analysis, we assume that there are two groups and two public goods. But our main arguments apply for any number of groups and public goods. We label the two groups in the population as h and f (for 'homme' and 'femme'), of size n_h and n_f respectively ($n_h + n_f = n$). We label the two public goods as 1 and 2.

If individual i is a member of group $g \in \{h, f\}$, his/her preferences are given by the following utility function:

$$U_g(x_i, y_1, y_2) = (x_i)^{\alpha} (y_1)^{\beta_{1g}} (y_2)^{\beta_{2g}} \tag{12}$$

where x_i denotes the level of i's private consumption and y_1 and y_2 denote the level of provision of public goods 1 and 2 respectively.

We impose the following conditions on the preference parameters.

Assumption 2. $\beta_{1h} > \beta_{1f}$ *and* $\beta_{2h} < \beta_{2f}$

Assumption 3. $\beta_{1h} + \beta_{2h} = \beta_{1f} + \beta_{2f} = \beta$ *where* $\beta \in (0, 1)$

The first assumption simply means (without loss of generality) that the male group has a stronger preference for public good 1 and the female group has a stronger preference for public good 2. The second assumption means that the two groups are alike in terms of their preferences between private goods and total public goods. We impose the second assumption to abstract away from any differences in behaviour that may arise due to differences in preferences for public goods in general. Note that Assumptions 2 and 3 allow the preference parameters β_{2h} and β_{1f} to take negative values. In other words, the second good may be a 'public bad' for men and the first good may be a 'public bad' for women.

The preferences of the elected official are defined in a similar manner:

$$U_m(x_i, y_1, y_2) = (x_m)^{\alpha_m} (y_1)^{\beta_{1m}} (y_2)^{\beta_{2m}}$$

As before, he receives a remuneration ω_m for his official work and his labour contribution cannot be contracted upon. He needs to allocate his time between the production of his own private good and the two distinct public goods. We indicate his labour contributions to his own private good and the two public goods by l_{xm}, l_{1m} and l_{2m} respectively.

As before, his chances of re-election will depend on how well he has served his constituents in the past. His tenure lasts for one period following which he has to contest elections. His probability of being successful at the elections is given by $\hat{\pi}\left(\lambda_h \mathbf{1}_h' \mathbf{U}_h + \lambda_f \mathbf{1}_f' \mathbf{U}_f\right)$ where $\mathbf{U}_h$ and $\mathbf{U}_f$ are vectors describing the utility levels achieved by, respectively, the male and female community members in

the preceding period and $\mathbf{1}_g$ is a vector of ones of dimension n_g and λ_h and λ_f are positive scalar terms. Thus, the elected official's chances of re-election depend on a weighted sum of utilities of his constituents with all individuals within each gender group assigned the same weight. As in the case of homogeneous preferences, we assume that the probability function is linear over the interval covering the minimum and maximum utility that community members can achieve in the game:

Assumption 4. $\hat{\pi}'(.) > 0$ *and* $\hat{\pi}''(.) = 0$ *in the interval* $\left[\lambda_h n_h U_h^{\min} + \lambda_f n_f U_f^{\min}, \lambda_h n_h U_h^{\max} + \lambda_f n_f U_f^{\max}\right]$ *where* $U_h^{\min} = \left(\frac{n_h}{\alpha n_h + \beta_{1h}}\right)^{\alpha+\beta_{1h}} \left(\frac{n_f}{\alpha n_f + \beta_{2f}}\right)^{\beta_{2h}} A_h$, $U_f^{\min} = \left(\frac{n_f}{\alpha n_f + \beta_{2f}}\right)^{\alpha+\beta_{2f}} \left(\frac{n_h}{\alpha n_h + \beta_{1h}}\right)^{\beta_{1f}} A_f$, $U_h^{\max} = \left(\frac{m+n_h}{\alpha+\beta_{1h}}\right)^{\alpha+\beta_{1h}} \left(\frac{m+n_f}{\alpha+\beta_{2f}}\right)^{\beta_{2h}} A_h$ *and* $U_f^{\max} = \left(\frac{m+n_f}{\alpha+\beta_{2f}}\right)^{\alpha+\beta_{2f}} \left(\frac{m+n_h}{\alpha+\beta_{1h}}\right)^{\beta_{1f}} A_f$, *where* $A_h = (\omega\alpha)^{\alpha} (\theta\beta_{1h})^{\beta_{1h}} (\theta\beta_{2f})^{\beta_{2h}}$ *and* $A_f = (\omega\alpha)^{\alpha} (\theta\beta_{2f})^{\beta_{2f}} (\theta\beta_{1h})^{\beta_{1f}}$.

As in the case of homogeneous preferences, the official's gain in utility from re-election is equal to a constant, Ψ. Note that the game can potentially have multiple Nash equilibria because both men and women can contribute to each public good. To simplify the analysis, we make an assumption about 'separate spheres' of activity for men and women, in the spirit of Lundberg and Pollak (1993). Specifically, we assume that men can only engage in public action with regard to good 1 while women can only engage in public action with regard to good 2. This gender division may be prescribed by social norms so that it is prohibitively costly for women to contribute to public good 2 or for men to contribute to public good 1, regardless of the preferences within each group.

The timing of events in the game are as described in Section 3.1, but we assume that only the female group has the choice of making the necessary investment for collective action at the first stage of the game.

3.2.1 Equilibrium in the Absence of Collective Action

First, we consider the case where community members decide on their contribution to the public good in an uncoordinated manner, and the outcome corresponds to a Nash Equilibrium. Recall that the existence of separate spheres implies that individuals in group *h* can only contribute to public

good 1 and individuals in group f can only contribute to public good 2. Then, the optimisation problem for an individual i belonging to group $g \in \{h, f\}$ is given by

$$\max_{l_{xig}, l_{1ig}} (x_{ig})^{\alpha} (y_1)^{\beta_{1g}} (y_2)^{\beta_{2g}}$$

subject to

$$\begin{aligned} l_{xig} + l_{1ig} &\leq 1 \\ x_{ig} &= \omega l_{xig} \\ y_1 &= \theta \left[m l_{1m} + \sum_{j=1}^{n_h} l_{1jh} \right] \\ y_2 &= \theta \left[m l_{2m} + \sum_{j=1}^{n_f} l_{2jf} \right] \end{aligned}$$

We restrict our focus to Nash equlibria where all individuals belonging to the same group make the same labour choices; i.e.

$$\begin{aligned} l_{xjg} &= l_{xg} \text{ for } g = h, f \\ l_{1jh} &= l_{1h} \text{ and } l_{2jh} = 0 \\ l_{2jf} &= l_{2f} \text{ and } l_{1jf} = 0 \end{aligned}$$

Then, from the first-order conditions, we obtain the following optimisation conditions:

$$l_{1h} = \frac{\beta_{1h} - \alpha m l_{1m}}{\alpha n_h + \beta_{1h}} \text{ and } l_{xh} = \frac{\alpha n_h + \alpha m l_{1m}}{\alpha n_h + \beta_{1h}} \text{ for men}$$

$$l_{2f} = \frac{\beta_{2f} - \alpha m l_{2m}}{\alpha n_f + \beta_{2f}} \text{ and } l_{xf} = \frac{\alpha n_f + \alpha m l_{2m}}{\alpha n_f + \beta_{2f}} \text{ for women}$$

Note that if $\alpha m l_{1m} > \beta_{1h}$ and $\alpha m l_{2m} > \beta_{2f}$, then we obtain a corner solution in which the community members do not make any contributions to the public good. Using the labour contributions derived above, we can calculate the utility level achieved by men and women in equilibrium for a

given level of labour contribution by the elected official in public goods:

$$U_h(x_h, y_1, y_2) = \left(\frac{ml_{1m} + n_h}{\alpha n_h + \beta_{1h}}\right)^{\alpha+\beta_{1h}} \left(\frac{ml_{2m} + n_f}{\alpha n_f + \beta_{2f}}\right)^{\beta_{2h}} (\omega\alpha)^{\alpha} (\theta\beta_{1h})^{\beta_{1h}} (\theta\beta_{2f})^{\beta_{2h}} \quad (13)$$

$$U_f(x_f, y_1, y_2) = \left(\frac{ml_{2m} + n_f}{\alpha n_f + \beta_{2f}}\right)^{\alpha+\beta_{2f}} \left(\frac{ml_{1m} + n_h}{\alpha n_h + \beta_{1h}}\right)^{\beta_{1f}} (\omega\alpha)^{\alpha} (\theta\beta_{2f})^{\beta_{2f}} (\theta\beta_{1h})^{\beta_{1f}} \quad (14)$$

It should be evident from the expressions of utility that an increase in the elected official's contribution to either public good would affect the welfare of both groups. But, *ceteris paribus*, women benefit more from contributions to public good 2 (since $\alpha + \beta_{2f} > \beta_{1f}$) and men benefit more from contributions to public good 1 (since $\alpha + \beta_{1h} > \beta_{2h}$).

3.2.2 Equilibrium in the Presence of Collective Action

Next, we consider the case where female community members coordinate their actions and choose the efficient level of contribution to public good 2 (recall that separate spheres implies that they cannot contribute to public good 1). For any given level of labour allocation by men, an efficient contract among the women would be given by the solution to the following optimisation problem:

$$\max_{(l_{xif}, l_{2if})} \sum_{i=1}^{n_f} \lambda_i (x_{if})^{\alpha} (y_1)^{\beta_{1f}} (y_2)^{\beta_{2f}}$$

subject to

$$\begin{aligned} x_{if} &= \omega l_{xf} \\ y_1 &= \theta \left[ml_{1m} + \textstyle\sum_{j=1}^{n_h} l_{1jh}\right] \\ y_2 &= \theta \left[ml_{2m} + \textstyle\sum_{j=i}^{n_f} l_{2jf}\right] \end{aligned}$$

where $\lambda_1, .., \lambda_{n_f}$ are Pareto weights. In our analysis, we focus on the symmetric equilibrium where the utility of each woman is weighted equally and they all make the same contribution to public good 2; i.e. $l_{2if} = l_{2f}$ for $i = 1, .., n_f$. Similarly, all men make the same contribution to public good

1; i.e. $l_{1ih} = l_{1h}$ for $i = 1,..,n_h$. Then, using the first-order condition, we obtain

$$l_{2f} = \frac{\beta_{2f} n_f - \alpha m l_{2m}}{\beta_{2f} n_f + \alpha n_f} \text{ and } l_{xf} = \frac{\alpha n_f + \alpha m l_{2m}}{\beta_{2f} n_f + \alpha n_f}$$

Since collective action enables the group to internalise the externalities provided by their respective contributions to the public good, the level of contribution to the public good is higher. If men do not undertake collective action, their labour contributions are given by the same equations as before (we discuss in the next section how collective action by men, exogenously determined, affects the analysis):

$$l_{1h} = \frac{\beta_{1h} - \alpha m l_{1m}}{\alpha n_h + \beta_{1h}} \text{ and } l_{xh} = \frac{\alpha n_h + \alpha m l_{1m}}{\alpha n_h + \beta_{1h}}$$

Using the labour contributions derived above, we can calculate the utility level achieved by men and women in equilibrium for a given level of labour contribution by the elected official in public goods:

$$U_h(x_h, y_1, y_2) = \left(\frac{m l_{1m} + n_h}{\alpha n_h + \beta_{1h}}\right)^{\alpha+\beta_{1h}} \left(\frac{m l_{2m} + n_f}{\alpha + \beta_{2f}}\right)^{\beta_{2h}} (\omega\alpha)^{\alpha} (\theta\beta_{1h})^{\beta_{1h}} \left(\theta\beta_{2f}\right)^{\beta_{2h}} \quad (15)$$

$$U_f\left(x_f, y_1, y_2\right) = \left(\frac{m l_{2m} + n_f}{\alpha + \beta_{2f}}\right)^{\alpha+\beta_{2f}} \left(\frac{m l_{1m} + n_h}{\alpha n_h + \beta_{1h}}\right)^{\beta_{1f}} (\omega\alpha)^{\alpha} \left(\theta\beta_{2f}\right)^{\beta_{2f}} (\theta\beta_{1h})^{\beta_{1f}} \quad (16)$$

The presence of collective action by women improves welfare for the male group if $\beta_{2h} > 0$ and reduces welfare for the male group if $\beta_{2h} < 0$. It improves welfare for the female group, and by a greater extent than for the male group since, by assumption, $\beta_{2f} > 0$ and $\beta_{2f} > \beta_{2h}$.

3.2.3 Why Collective Action Makes a Difference

In this section, we show why and how the presence of collective action affects the incentives of the elected official. Let us suppose that he assigns all individuals of the same gender group the same weight. And, let us denote the weights assigned to male and female community members by λ_m and λ_f respectively. Then the elected official's optimal choice should satisfy the following equation (We will derive this condition from the elected official's optimisation problem in Section

3.2.4):

$$\lambda_m n_m \frac{\partial U_h}{\partial l_{1m}} + \lambda_f n_f \frac{\partial U_f}{\partial l_{1m}} = \lambda_m n_m \frac{\partial U_h}{\partial l_{2m}} + \lambda_f n_f \frac{\partial U_f}{\partial l_{2m}}$$
$$\implies \hat{n}_m \left(\frac{\partial U_h}{\partial l_{1m}} - \frac{\partial U_h}{\partial l_{2m}} \right) = \hat{n}_f \left(\frac{\partial U_f}{\partial l_{2m}} - \frac{\partial U_f}{\partial l_{1m}} \right) \tag{17}$$

where $\hat{n}_m = \lambda_m n_m$ and $\hat{n}_f = \lambda_f n_f$. In words, equation (17) says that the effect of a shift in a unit of labour from public good 2 to public good 1 on the weighted sum of utilities of male members of the community should be equal and opposite to its effect on the weighted sum of utilities of female members of the community. Using (13)-(16) and (17), we can show that the elected official's optimal choice must satisfy the following condition (the derivation is shown in the proof of Lemma 2):

$$\frac{U_h}{U_f} = \frac{\hat{n}_f}{\hat{n}_m} \left[\left(\frac{\alpha m + \beta_{2f} m}{m l_{2m} + n_f} \right) - \left(\frac{\beta_{1f} m}{m l_{1m} + n_h} \right) \right] \left[\left(\frac{\alpha m + \beta_{1h} m}{m l_{1m} + n_h} \right) - \left(\frac{\beta_{2h} m}{m l_{2m} + n_f} \right) \right]^{-1} \tag{18}$$

where U_h and U_f are, respectively, the utility achieved by the male and female community members. The conditions in (17) and (18) hold whether or not members of the community are undertaking collective action.

For any given combination of l_{1m} and l_{2m}, the ratio $\frac{U_h}{U_f}$ is smaller when women undertake collective action (since such collective action helps the female group more than the male group). Therefore, the combination of l_{1m} and l_{2m} that is optimal in the absence of collective action – i.e. satisfies (18) – cannot be optimal in the presence of collective action. Thus, if the total amount of labour allocated to public goods is fixed, the elected official's optimal allocation of labour involves a larger l_{2m} and a smaller l_{1m} under collective action. In other words, once the women organise, the elected official applies more labour in providing the public good that they care about more.

Formally, we have the following result.

Lemma 2. *Assume that the elected official maximises a weighted sum of utilities of the electorate, applying the same weight to individuals of the same gender, and the total amount of the elected official's labour available for the two public goods is fixed. Assume also that men do not undertake collective action in the provision of public good* 1*. Under Assumptions 2 and 3, if women organise to take collective action in the provision of public good* 2*, the elected official shifts labour from public good* 1 *to public good* 2*, compared to the situation where they do not.*

Proof. See Appendix B. □

So far we have assumed that the men do not undertake any collective action. If the men do take collective action in contributing to public good 1, then it would increase the level of provision of this good and, therefore, affect the level of utility achieved by both groups. But it is straightforward to extend the analysis above to show that, in such circumstances, a switch by women from a symmetric Nash equilibrium to collective action in contributing to public good 2 would still cause the elected official to shift his labour towards this public good. This is shown in Lemma 3 provided in Appendix B.

3.2.4 The Elected Official's Optimal Choice

Using Lemma 2, we can determine how the female community members' decision about whether or not to undertake collective action affects the labour contribution by the elected official in the two public goods. At the second stage of the game, the elected official's optimisation problem can be written as follows:

$$\max_{l_{1m},l_{2m}} U_m(x_m, y_1, y_2) = (x_m)^{\alpha} (y_1)^{\beta_{1m}} (y_2)^{\beta_{2m}} + \hat{\pi} \left(\lambda_h n_h U_h + \lambda_f n_f U_f \right) \Psi$$

subject to

$$\begin{aligned} x_m &= \omega_m + \omega l_{xm} \\ y_1 &= n\theta l_{1y} + m\theta l_{1m} \\ y_2 &= n\theta l_{2y} + m\theta l_{2m} \end{aligned}$$

where l_{1y} and l_{2y} are the equilibrium level of labour contribution in the public goods – and U_h and U_f are the utility levels achieved – by male and female community members respectively, as derived in Sections 3.2.1 and 3.2.2. Furthermore, $l_{xm} = 1 - l_{1m} - l_{2m}$.

From the first-order conditions to the elected official's optimisation problem, we obtain, as-

suming an interior solution,

$$\begin{aligned}
& \alpha_m \omega (x_m)^{\alpha_m - 1} (y_1)^{\beta_{1m}} (y_2)^{\beta_{2m}} \\
= \; & \beta_{1m} m \theta (x_m)^{\alpha_m} (y_1)^{\beta_{1m}-1} (y_2)^{\beta_{2m}} + \Psi \sum_{i=1}^{n_h} \lambda_h \hat{\pi}' (.) \frac{dU_h}{dl_{1m}} + \Psi \sum_{i=n_h+1}^{n} \lambda_f \hat{\pi}' (.) \frac{dU_f}{dl_{1m}} \\
= \; & \beta_{2m} m \theta (x_m)^{\alpha_m} (y_1)^{\beta_{1m}} (y_2)^{\beta_{2m}-1} + \Psi \sum_{i=1}^{n_h} \lambda_h \hat{\pi}' (.) \frac{dU_h}{dl_{2m}} + \Psi \sum_{i=n_h+1}^{n} \lambda_f \hat{\pi}' (.) \frac{dU_f}{dl_{2m}} \qquad (19)
\end{aligned}$$

The introduction of collective action in public good 2 would increase the marginal utility of the elected official's contribution to that public good. On the other hand, to the extent that the elected official receives utility directly from that public good, it would increase his incentive to free-ride on the contribution made through collective action. These two effects would go in opposite directions and their effect on the elected official's contribution is ambiguous.

If $\beta_{1m} = \beta_{2m} = 0$ – i.e. the official has no intrinsic preference for the public goods – then the incentive to free-ride is absent. Note that we can obtain the equation in (17) by plugging in $\beta_{1m} = \beta_{2m} = 0$, and rearranging the second equation in (19). In this case, using Lemma 2 and Lemma 3, we can show that the elected official's labour contribution to public good 2 will be higher if women opt for collective action at the first stage of the game. For the case $\beta_{1m}, \beta_{2m} > 0$, we can show that the official's re-election incentive will outweigh the incentive to free-ride for Ψ sufficiently large. Therefore, when women opt for collective action, he will provide a higher labour contribution to public good 2 assuming that he cares sufficiently about being re-elected. Formally, we obtain the following proposition.

Proposition 2. *Suppose Assumptions 2-4 hold and that* $\beta_{2h} \geq 0$. *(i) Assume that the elected official has no intrinsic preference for the public goods. The elected official allocates a higher level of labour in the provision of public good* 2 *when women organise and take collective action compared to the situation where they do not. (ii) If the elected official has an intrinsic preference for the public goods, i.e.* $\beta_{1m}, \beta_{2m} > 0$, *then the same result is obtained for* Ψ *sufficiently large.*

Proof. See Appendix B. □

The effect of collective action by women on the official's contribution to public good 1 is ambiguous. Although the official will tend to shift his available labour towards public good 2 in

response to the women's collective action, it is possible that his contribution to public good 1 will also increase as the public goods may be complementary goods in the preferences of the electorate.

If public good 2 imposes a negative externality on men, i.e. $\beta_{2h} < 0$, then the official may not increase his labour contribution towards the good in response to collective action by women. This is because collective action by women would not only increase the effect of the official's labour on the marginal utility of women but also that on the marginal disutility of men. But, because of continuity of the functions involved, it can be shown that the results of Proposition 2 will continue to hold if the negative externality is sufficiently small.

It follows from Proposition 2 that, if the relevant conditions hold, women will achieve higher utility under collective action (not only because the labour allocation within the group is efficient but also because the official shifts effort towards the public good for which they have a stronger preference). Whether this gain in utility is sufficient for them to make the necessary investment for undertaking collective action at the first stage of the game will depend on the size of the fixed cost C, as discussed in Section 3.1.4. As the cost may vary across communities, women in some communities may find it in their interest to form collective action groups while others may not. We discuss this issue in more detail in Section 4.

4 Implications of the Theory for SHGs and Collective Action

In this section, we discuss the implications of our theoretical results in the context of women's SHGs that, as we have discussed, engage in various types of collective action to address issues of public concern within their ward.

First, it is important to recognise that undertaking collective action involves some fixed costs. The participating individuals have to agree on what action they will undertake, negotiate about the division of labour within the group, and setup a monitoring and enforcement mechanism to minimise free-riding. As discussed in Section 2.2, there is a variety of groups in the PRADAN villages which undertook collective actions before the NGO began its operations. However, we found only one *women-only* group and women play a minor role in the other groups. We argue that

the creation of SHGs provides a space for women to interact in a group on a regular basis, build trust and develop organisational skills, thereby lowering the cost of collective action regarding ward-level issues of interest to women. The creation of these SHGs thus increases the capacity of women in the ward to organise and undertake collective action on 'women's issues' in the subsequent years.

Let us denote by U_c^i the utility that women in ward i obtain if they undertake collective action, as represented by equation (16). Similarly, let U_n^i denote the corresponding utility when they do not undertake collective action, as represented by equation (14). The gain from undertaking collective action $U_c^i - U_n^i$ will vary across wards according to the preferences of the WMs and the divergence in preferences of his or her constituents. Let us represent the distribution of gains by the c.d.f. $F(.)$. Following the reasoning in Section 3.2.2, the theoretical model implies that members of the SHG would always experience higher welfare when they undertake collective action compared to when they do not; i.e. $F(0) = 0$. Let us denote by C_0 the fixed cost per woman for engaging in collective action when they do not have any kind of external organisational support. Given the absence of women-only groups which undertook collective action prior to the creation of the SHGs, it seems reasonable to assume that $U_c^i - U_n^i < C_0$ for each i; i.e. $F(C_0) = 1$.

The creation of SHGs, we argue, lowered the cost of collective action to $C_{shg} < C_0$ such that some fraction of the SHGs found it in their interest to organise themselves and undertake collective action; i.e. $F\left(C_{shg}\right) < 1$.

We argue that, in our empirical setting, the WMs have similar strategic interests to those of the 'elected official' considered in the theoretical model. The WMs care about being re-elected and, therefore, have incentives to take action regarding the public issues that his constituents consider to be of high priority. On the other hand, the time he spends addressing the ward's problems and needs has an opportunity cost in terms of the loss of earnings from alternative income-generating activities. Furthermore, the WM's strategic incentives depend on whether his electorate - including members of SHGs - are capable of undertaking collective action.

As discussed in Section 2.2, the members of the SHG undertake two types of action that com-

plement the WM's own efforts: (i) communicating their concerns about a public issue to a higher official; and (ii) intervening directly in the ward. In the empirical analysis, we define the SHG as being *active* if the survey records either of these undertakings during the relevant time period.

It should be noted that, for a number of public goods (for example, public infrastructure, welfare schemes, etc.), resources and inputs provided by higher government authorities are an essential element in their provision. But, in the context of the PRADAN villages, the WMs and citizens provide an important input for the provision of such goods by identifying problems or ensuring the quality of delivery. The labour contributions by the elected official and individuals that we model would correspond to these types of inputs. We do not model the contributions of the higher authorities explicitly, as our focus is on the strategic interaction between the WMs and citizens.

It is important to note that whether or not an SHG is *active* is an endogenous variable in our setting. The SHG may choose not to engage in collective action if, for example, the WM is doing a satisfactory job of addressing their social concerns. However, the timing of the *creation* of SHGs provides an exogenous source of variation in collective action by SHGs. As discussed in Section 2.4, SHGs generally became active with a time-lag following their creation. This is logical given that members of the SHG would have to gain expertise regarding its basic operations before it is able to engage in collective action. Thus, the variation in the timing of SHG creation allows us to estimate how WMs would respond to exogenous changes in the level of collective action among their female constituents.

As mentioned in Section 2.4, we do not directly observe the WM's effort in addressing issues of interest to his or her constituents. But we do have information on the set of issues regarding which the SHGs engaged in collective action and the type of issues that the WMs dealt with (see Table 2). Table 3 shows that some issues of concern to the women's groups, such as 'alcohol problems' and 'school problems', had been dealt with by very few WMs before the SHGs were created. Proposition 2 implies that an exogenous increase in collective action increases the WM's labour contribution to public issues of interest to women and therefore, in the present context, increases the probability that the WM tackles such issues.

Relatedly, it should be noted that if there were certain issues that did not concern the women's groups or were outside of their sphere of control, then, as per the discussion in Section 3.2.4, an increase in collective action by women may cause the WM to decrease his or her effort in providing them. But we would not be able to detect the change in our data unless the WM ceased his efforts altogether. This is unlikely to be the case and we find no evidence of this in the descriptive statistics. Combined with the reasoning in the previous paragraph, this implies that collective action by the SHGs may have caused their WMs to *increase* the number of public issues they dealt with. Thus, the predictions - based on Proposition 2 - that we test empirically can be summarised as follows.

Prediction 1. *An exogenous increase in collective action by women within the ward, due to the creation of a SHG, would increase the probability that the WM tackles public issues that are of interest to the group, and would cause the WM to tackle a greater variety of issues.*

As discussed in Section 2.2, some PRADAN villages included other groups, primarily composed of men, which also undertook collective action on a variety of community-level issues. As discussed in the Sections 3.2.3 and 3.2.4, our theoretical result – on how an elected official responds to the introduction of collective action by women – holds regardless of whether or not male members of the community undertake collective action. Therefore, Prediction 1 is applicable both in communities where there were pre-existing male groups which undertook collective action on ward-related issues and in communities where there were not.

5 Empirical Analysis

We first discuss the identification strategy. Next, we formally test the prediction suggested by the model and we run a placebo regression. Finally, we analyse the qualitative impact.

5.1 Identification Strategy

To test the prediction of our model, we gathered, for each ward, information on the political activities over the past 20 years (four elections). We asked WMs about the type of issues they dealt with, i.e. the issues for which they visited a higher official or intervened directly in the ward. This allows us to construct a panel for 141 wards.

Consider the following OLS regression to estimate whether the collective actions undertaken by SHGs have an effect on the activities of WMs:

$$T_{ijt} = \alpha_1 + \alpha_2 \text{ SHG active}_{ijt} + \alpha_3 X_{ijt} + C_t + D_j + \varepsilon_{ijt} \tag{20}$$

where T_{ijt} be the total number of different issues that WM i, elected in ward j in year t, deals with. *SHG active* is a dummy that takes value 1 if an SHG started undertaking collective actions in ward j before or during the mandate of WM i. The dummy takes value 0 if no SHG was present in ward j during the mandate of WM i, or if existing SHGs did not yet start undertaking collective actions. X_{ijt} are WM level characteristics, including education level, land ownership, the total number of children, age, caste category[17], and a dummy indicating the WM is a man. C_t is a set of three dummies controlling for the year in which the WM was elected (elected in '92, '97, and '02). The dummies are included to ensure that our variable of interest does not pick up election year effects, as for example the quality of WMs might increase over time. Finally, D_j are ward fixed effects that control for differences in time-invariant unobservables across wards, and ε_{ijt} is the error term. We cluster the standard errors at the ward level. Our panel is WM specific, so in case a WM is reelected, we have information for the full period only (we assumed it would be difficult for WMs to provide term-wise information).[18]

The decision of an SHG to become active is potentially endogenous. OLS underestimates the influence of SHGs on the activities of WMs if SHGs choose not to engage in collective action because the WM is doing a satisfactory job. On the other hand, we overestimate the effect if a WM particularly sensitive to women issues encourages SHGs to undertake collective actions. As discussed in Section 4, we use the variation in the timing of the creation of SHGs as an exogenous source of variation in the timing of the first collective action by SHGs. Table 4 overviews the evolution of both the creation of SHGs and their activity over the election periods. The first SHGs

[17] Castes are classified in the following categories: ST (scheduled tribe), SC (scheduled caste) and OBC (other backward caste) / FC (forward caste).

[18] To test the sensitivity of our results, we also run regressions in which we include term-wise information. The dependent variable is the same over the different terms, but the independent variables differ. Our results do not change using this different specification, and are available upon request.

Table 4: The creation and activity of SHGs by election period

	Election mandate:			
	1992-1996	1997-2001	2002-2006	2007-2011
% of wards in which at least one SHG has been created	0.0	42.6	100.0	100.0
% of wards in which at least one SHG has started undertaking collective actions (conditional on an SHG being present)	0.0	28.3	68.1	92.9

were created during the 1997-2001 election period and, by the end of the 2002-2006 period, all wards had at least one SHG. As mentioned before, on average, SHGs that undertake collective actions, do so for the first time after 3 years of weekly meetings. Therefore, it is not surprising that most SHGs start undertaking collective actions during the mandates 2002-2006 and 2007-2011.

We will instrument *SHG active* by whether or not an SHG was created in the ward during the relevant time period. Our approach leads to the following first stage regression:

$$\text{SHG active}_{ijt} = \beta_1 + \beta_2 \text{SHG created}_{ijt} + \beta_3 X_{ijt} + C_t + D_j + \zeta_{ijt}$$

where *SHG created* is a dummy that takes value 1 if SHGs were present in ward j during the mandate of WM i. We use the parameters to predict whether SHGs undertake collective actions, and estimate consistent estimators for:

$$T_{ijt} = \delta_1 + \delta_2 \widehat{\text{SHG active}}_{ijt} + \delta_3 X_{ijt} + C_t + D_j + \theta_{ijt} \tag{21}$$

The assumption underlying this analysis is that the timing of the creation of SHGs is uncorrelated with pre-existing differences in the tendency to intervene for issues across wards, after controlling for time varying WM characteristics, time invariant ward characteristics and a common trend. We assess the plausibility of this assumption in Section 5.1.1.

5.1.1 Exogeneity of the Timing of SHG Creation

In 1994, PRADAN opened an office in the town Keonjhar and started operating in the poorest block, namely Banspal, which is southwestwards of the town (Figure 1). The initial focus was

on agriculture, as villagers owned some land and small, but perennial rivulets were available to provide irrigation without the need of major investments. A few years later, in 1998, PRADAN started promoting SHGs to provide extra resources to strengthen livelihoods.

In the following years, PRADAN identified the poorest regions in the contiguous areas and expanded its activities. At first, two new offices were opened: one in Suakati, in the Banspal block in 1998 (Figure 1), and a second in Turumunga, in the Patna block in 1999 (Figure 2). Later, from 2000 onwards, employees based at the Keonjhar town office started activities in the Keonjhar Sadar block, located to the west of Keonjhar (Figure 1), and in the adjacent Karanjia block, which is located in the Mayurbhanj district (Figure 3).

PRADAN's decision about where to operate was based on the suitability of an area for its agricultural programs. We surveyed all the wards where PRADAN operates in the Keonjhar and Mayurbhanj districts of Odisha. Therefore, we believe that, in terms of our research question, the program placement bias is limited. However, the program timing bias is a concern if the wards in which PRADAN started working earlier within blocks are systematically different with respect to the outcomes of interest.

Figures 1, 2 and 3 show the villages in which PRADAN promoted SHGs. We show villages instead of wards, as ward-level maps do not exist. The villages are a good approximation, as 75% of the villages encompass exactly the same territory as wards and only 2.8% of the wards cover several villages. We colored the villages according to the mandate during which a first SHG was created in the village: 1997-2001 versus 2002-2006. We distinguish between these two periods, as they correspond to the election periods during which SHGs were created (see Table 4).[19] The maps reveal two important patterns. First, all PRADAN offices in all blocks created SHGs both before and after the 2002 elections. Second, the villages in which SHGs were created earlier and later are neighboring one another. This is the result of PRADAN's preference for having the same employee operate in the same villages over time: each employee is assigned a cluster of neighboring villages in which he creates SHGs following the pace and the direction he considers appropriate. This

[19] In case there are several wards in the village, we use the mandate during which the first SHG was created in any of the wards that belong to that village.

policy saves traveling time and limits transportation costs. We address potential employee biases by including ward fixed effects. As the villages in which PRADAN created SHGs before 2002, and those in which SHGs were created later are situated close together, it is likely that they have similar socioeconomic characteristics. We check whether this is indeed the case in the Tables 5 and 6.

Table 5 displays data from the 1991 Census of India. The village is the lowest level at which data is available, so we cannot do a ward-level comparison. We could match all but three villages (105 total). The first column provides details on villages in which the first SHG was created during the 1997-2001 mandate, the second column on villages that had a first SHG created during the 2002-2006 mandate, and the third column provides the difference. With the exception of power supply, there are no significant differences for a wide range of facilities and public infrastructures. Villages also have the same size, and similar rates of employment, and literacy. We also used all the variables in Table 5 to predict SHG creation (a dummy taking value 1 (0) if the first SHG was created in 2002-2006 (1997-2001)). We cannot reject the joint null hypothesis (p-value = 0.64).[20] This result provides a strong argument in favor of SHG creation not being influenced by the elected WMs.

Next, Table 6 shows the outcome variables and controls of our main regressions for the period 1992-1996, i.e. before the first SHGs were created, at the ward level. The difference is substantial for welfare schemes, but small for the other variables. They are also inconsistent in sign.[21]

5.2 Results

First, we measure the impact of SHGs on the number of different problems a WM deals with. The results are shown in Table 7. The columns (1) and (2) provide the estimates using OLS (equation 20), and the columns (3) and (4) using instrumental variables (equation 21). Regressions without WM controls are provided in the odd numbered columns and those with controls in the

[20] The regression is available upon request.

[21] We excluded the WMs who have been re-elected in 1997 and faced SHGs undertaking collective actions, since for them we do not have disaggregated information. This reduces the number of observations, but allows us to compare information on WMs before SHGs were active.

Table 5: Village characteristics based on the Census of India 1991, by mandate during which a first SHG was created in the village

	First SHG created in the village in		
	1997-2001 (Std. Dev.)	2002-2006 (Std. Dev.)	Difference (Std. Err.)
Number of households	129.3	112.4	16.9
	(83.2)	(84.5)	(16.5)
Literacy rate of women	12.3	15.5	-3.2
	(9.5)	(10.9)	(2.0)
Literacy rate of men	33.1	37.6	-4.5
	(16.0)	(17.2)	(3.3)
Employment rate of women	18.8	16.3	2.5
	(15.8)	(16.9)	(3.2)
Employment rate of men	53.6	51.9	1.7
	(5.2)	(9.3)	(1.5)
EDUCATION FACILITIES			
Number of primary schools	0.87	0.78	0.09
	(0.40)	(0.46)	(0.09)
Number of middle schools	0.24	0.14	0.10
	(0.43)	(0.39)	(0.08)
Number of high schools	0.13	0.07	0.06
	(0.34)	(0.31)	(0.06)
MEDICAL FACILITIES			
A medical facility is available (% of villages)	15.2	6.8	8.4
	(36.3)	(25.4)	(6.0)
DRINKING WATER FACILITIES			
Well water (% of villages)	73.9	83.1	-9.2
	(44.4)	(37.8)	(8.0)
Tank water (% of villages)	45.7	54.2	-8.5
	(50.4)	(50.2)	(9.9)
Tube well (% of villages)	30.4	32.2	-1.8
	(46.5)	(47.1)	(9.2)
River water (% of villages)	28.3	20.3	8.0
	(45.5)	(40.6)	(8.4)
OTHER INFRASTRUCTURE			
Bus stop (% of villages)	17.4	13.6	3.8
	(38.3)	(34.5)	(7.1)
Village accessibility by paved road (% of villages)	28.3	25.4	2.9
	(45.5)	(43.9)	(8.8)
Market facility available (% of villages)	13.0	6.8	6.2
	(34.1)	(25.4)	(5.8)
Power supply (% of villages)	54.3	71.2	-16.9*
	(50.4)	(45.7)	(9.4)
Irrigated land (% of land)	5.2	6.1	-0.9
	(11.4)	(17.6)	(3.0)
Number of villages	46	59	

Table 6: Summary statistics at baseline (1992-1996), by mandate during which a first SHG was created

	First SHG created in the ward in		
	1997-2001	2002-2006	Difference
DEPENDENT VARIABLES FOR 1992-1996			
Number of ward problems addressed by the WMs	1.42	1.36	0.06
	(0.87)	(1.09)	(0.23)
WM deals with alcohol issues (%)	0.0	2.6	-2.6
	(0.0)	(16.0)	(2.8)
WM deals with school issues (%)	6.1	7.7	-1.6
	(24.2)	(27.0)	(6.1)
WM deals with forest issues (%)	18.2	23.1	-4.9
	(39.2)	(42.7)	(9.7)
WM deals with public infrastructure (%)	78.8	71.8	7.0
	(41.5)	(45.6)	(10.4)
WM deals with welfare schemes (%)	39.4	25.6	13.8
	(49.6)	(44.2)	(11.1)
CHARACTERISTICS WMs IN 1992-1996 (= independent variables)			
Male (%)	87.9	79.5	8.4
	(33.1)	(40.9)	(8.9)
Education level (years)	4.9	6.8	-1.9**
	(3.1)	(3.7)	(0.8)
Land (acres)	3.0	3.2	-0.2
	(2.0)	(7.8)	(1.4)
Number of children	3.7	3.1	0.6
	(1.8)	(1.8)	(0.4)
Age	58.8	52.3	6.5
	(11.1)	(12.2)	(2.8)
Caste category: SC (%)	6.1	7.7	-1.6
	(24.2)	(27.0)	(6.1)
Caste category: OBC/FC (%)	12.1	25.6	-13.5
	(33.1)	(44.2)	(9.4)
Number of wards	33	39	

Standard deviations are given in parentheses.

even numbered columns.

WMs operating in wards where SHGs have started undertaking collective actions, deal with 1.5 extra issues compared to WMs who operate in wards where SHGs are not present or do not undertake actions. The result confirms our prediction: an increase in collective actions within the ward causes the WM to tackle a greater variety of issues. The coefficients are significant, but slightly smaller in size in the OLS regressions. We also find that, overall, male WMs deal with fewer issues.

Table 7: The effect of collective actions by SHGs on the number of issues addressed by the WM

	Number of issues addressed by the WM			
	OLS		2SLS	
	(1)	(2)	(3)	(4)
SHG active	0.89***	0.91***	1.48***	1.54***
	(0.16)	(0.16)	(0.42)	(0.42)
Male		-0.29**		-0.33***
		(0.12)		(0.13)
Education level (years)		0.03		0.03
		(0.02)		(0.02)
Land (acres)		-0.04***		-0.04***
		(0.01)		(0.01)
Number of children		-0.02		-0.01
		(0.03)		(0.03)
Age		0.05*		0.05*
		(0.03)		(0.03)
Squared age		-0.00*		-0.00
		(0.00)		(0.00)
Caste category: SC		-0.16		-0.12
		(0.21)		(0.23)
Caste category: OBC/FC		0.02		0.06
		(0.16)		(0.17)
Ward fixed effects	yes	yes	yes	yes
Election year dummies	yes	yes	yes	yes
F-stat first stage			31.6	29.1
Observations	441	441	441	441

An observation in the regression model is a WM. The dependent variable is the total number of different issues that the WM deals with during his mandate. The variable "SHG active" is a dummy that takes value one if an SHG started undertaking collective actions in ward j before or during the mandate of WM i. The first two columns provide the results using standard linear regression techniques. In the last two columns we instrument for "SHG active", using the timing of SHG creation in the ward. The uneven columns do not include WM characteristics, while the even columns do so. Standard errors clustered at the ward level are given in parentheses. *** significant at 1 percent, ** significant at 5 percent, * significant at 10 percent

Next, we examine the type of extra issues the WM starts dealing with. To do that, we replace

the left hand side variable of the equations (20) and (21), by T_{ijtk}, a dummy equal to one if WM i, elected in ward j in year t, deals with issue k. The independent variables are the same. The results are given in Table 8. The odd numbered columns provide the results using OLS, and the even numbered columns using IV.

Table 8: The effect of collective actions by SHGs on the type of issues WMs deal with

	Probability that the WM deals with:									
	Alcohol issues		School issues		Forest issues		Infrastructure		Welfare scheme	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
SHG active	0.30***	0.29**	0.19***	0.31**	0.22***	0.35**	0.04	0.10	0.14*	0.40*
	(0.06)	(0.14)	(0.06)	(0.14)	(0.05)	(0.17)	(0.07)	(0.21)	(0.08)	(0.23)
Male	-0.11***	-0.11***	-0.07	-0.08*	-0.06	-0.06	0.09*	0.09*	-0.14***	-0.16***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.06)
Education level (years)	0.01**	0.01**	-0.00	-0.00	-0.01	-0.01	0.00	0.00	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Land (acres)	-0.01	-0.01	-0.01***	-0.01***	-0.01	-0.01	-0.01	-0.01	-0.00	-0.00
	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Number of children	-0.02**	-0.02**	0.01	0.01	-0.00	0.00	-0.03	-0.03	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)
Age	0.00	0.00	0.01	0.01	0.00	0.00	0.02*	0.02*	0.02*	0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Squared age	0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00*	-0.00*	-0.00*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Caste category: SC	-0.08	-0.08	0.05	0.06	-0.12	-0.12	-0.10	-0.10	0.11	0.13
	(0.06)	(0.06)	(0.08)	(0.08)	(0.08)	(0.08)	(0.09)	(0.09)	(0.11)	(0.11)
Caste category: OBC/FC	-0.14**	-0.14**	0.08*	0.08**	-0.03	-0.03	-0.01	-0.01	0.16**	0.18**
	(0.06)	(0.06)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.07)	(0.07)
Ward fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Election year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	441	441	441	441	441	441	441	441	441	441

An observation in the regression model is a WM. The dependent variable is a binary variable that equals one if the WM deals with the issue during his mandate. The variable "SHG active" is a dummy that takes value one if an SHG started undertaking collective actions in ward j before or during the mandate of WM i. The odd numbered columns provide the results using OLS. In the even numbered columns we instrument for "SHG active", using the timing of SHG creation in the ward. Standard errors clustered at the ward level are given in parentheses. *** significant at 1 percent, ** significant at 5 percent, * significant at 10 percent.

Once SHGs undertake collective actions, WMs are 29% more likely to deal with alcohol problems, 31% with school problems and 35% with forestry issues. WMs are also more likely to start dealing with welfare schemes. Thus, the estimates confirm that WMs start dealing with public goods that are of interest to SHGs (see Section 2.2). The bias is similar to the previous regression: The IV coefficients are close to or larger than their OLS counterparts.

Interestingly, male WMs are less likely to take care of alcohol issues, school problems and welfare schemes, but they are more likely to deal with public infrastructure.

5.3 Placebo Regression

In this section, we perform a placebo regression. SHGs become active during the election periods 2002-2006 and 2007-2011 in 78% of the wards (see Table 4). *Before* 2002, there should not be differences between wards where SHGs started undertaking collective actions in 2002-2006 as compared to those in which SHGs became active in 2007-2011. To test this, we restrict our data set to WMs whose mandate finished before 2002, i.e. we keep the election periods 1992-1996 and 1997-2001, and run the following differences-in-differences regressions:

$$\begin{aligned} T_{ijt \mid t<2002} &= \beta Active_{2002-2006} + X'_{ijt}\gamma + \delta Elected1997 + D_j + \varepsilon_{ijt} \\ T_{ijtk \mid t<2002} &= \beta Active_{2002-2006} + X'_{ijt}\gamma + \delta Elected1997 + D_j + \varepsilon_{ijt} \end{aligned}$$

T_{ijt} is the total number of different issues that the WM deals with, and T_{ijtk} a dummy equal to one if WM i, elected in ward j in year t, deals with issue k. The binary variable $Active_{2002-2006}$ takes value one if SHGs became active in the ward in the election period 2002-2006 and zero otherwise. The election year dummies C_t are replaced by a dummy indicating that the WM is elected in 1997. SHGs became active during the election period 1997-2001 in 12.2% of the wards (Table 4). We drop these wards in the regressions.[22]

Table 9 shows that the timing of becoming active (2002-2006 versus 2007-2011) does not affect the number of issues discussed before 2002: the difference is small (less than one third of an issue) and not significant. The type of issues discussed are not significantly different either. Therefore, we can conclude that the WM's public good activities - prior to the first SHGs being active - cannot be predicted by the fact that SHGs will become active in the future.

5.4 The Qualitative Impact

As mentioned in Section 2.3, a caveat of our empirical results is that we can focus on the *type* of public goods only and not on the quality of the work of the WM. To partially overcome this limita-

[22]The results do not change if we include those wards. The independent variable "Caste category: SC" is omitted due to perfect collinearity. We do not have results for alcohol issues, as there is not enough variation (only 2% of the WMs dealt with this topic before 2002).

Table 9: Placebo test

	Prediction 1	Prediction 2			
	Number of issues addressed by the WM	Probability that the WM deals with: School issues	Forest issues	Infrastructure	Welfare schemes
	(1)	(2)	(3)	(4)	(5)
$Active_{2002-2006}$	-0.28	-0.04	-0.02	-0.15	0.00
	(0.20)	(0.04)	(0.06)	(0.13)	(0.13)
Male	-0.09	0.03	-0.01	0.11	-0.22
	(0.24)	(0.03)	(0.03)	(0.15)	(0.13)
Education level (years)	0.05*	-0.00	0.01	0.02	0.00
	(0.03)	(0.00)	(0.01)	(0.02)	(0.02)
Land (acres)	0.00	0.00	0.00	-0.00	0.00
	(0.01)	(0.00)	(0.00)	(0.01)	(0.00)
Number of children	-0.05	0.00	0.00	-0.08**	0.03
	(0.06)	(0.00)	(0.01)	(0.04)	(0.03)
Age	0.02	0.02	0.01	0.04	-0.05
	(0.09)	(0.02)	(0.01)	(0.05)	(0.05)
Squared age	-0.00	-0.00	-0.00	-0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Caste category: OBC/FC	-0.58	-0.08	-0.03	-0.33*	-0.13
	(0.40)	(0.08)	(0.04)	(0.19)	(0.24)
Elected in '97	0.55***	0.02	0.06	0.29**	0.12
	(0.17)	(0.02)	(0.06)	(0.11)	(0.11)
Ward fixed effects	yes	yes	yes	yes	yes
N	142	142	142	142	142

An observation in the regression model is a WM. The data set is restricted to WMs whose mandate ended before 2002. In column (1) the dependent variable is the total number of different issues that the WM deals with during his mandate. In columns (2)-(5) the dependent variable is a binary variable that equals one if the WM deals with the issue during his mandate. The variable "$Active_{2002-2006}$" is a binary variable that equals one if SHGs became active in the ward in the election period 2002-2006 and zero otherwise. Standard errors clustered at the ward level are given in parentheses. *** significant at 1 percent, ** significant at 5 percent, * significant at 10 percent

tion, we asked SHGs how effective their collective actions were, i.e., whether they obtained what they requested or, at least, received the promise that a solution was to be provided. The answers to these questions are summarized in column (1) of Table 10. SHGs obtained what they requested in 43 to 60 percent of the wards where they undertook collective actions and they received the promise that a solution would be provided in 28 to 47 percent of the wards. They received either a solution or promise in 86 to 92 percent of the wards (obtained by summing up the percentages).[23] Most likely column (1) overestimates the success of SHGs, as there might be a selection issue: SHGs undertake actions only if they believe they will be successful. We try to correct for selection in the columns (2) and (3). For each type of issue, we asked SHGs if they faced it at least once. In column (2) we show the percentages over all the wards where the problem appeared, independent of whether an SHG undertook action or not. Hence, this is equivalent to treating SHGs which did not undertake actions as not successful. Finally, in column (3), we assume that all the problems appeared in all the wards.

Table 10: Outcome of collective actions undertaken by SHGs

	(1) Wards where SHGs undertook collective actions			(2) Wards where the problem appeared			(3) All wards		
	Wards (#)	Solution (%)	Promise (%)	Wards (#)	Solution (%)	Promise (%)	Wards (#)	Solution (%)	Promise (%)
Public infrastructure	92	42.5 (34.0)	46.8 (35.5)	135	20.0 (25.0)	23.7 (29.7)	141	17.1 (23.1)	19.7 (25.9)
Welfare schemes	60	59.2 (42.1)	30.5 (37.6)	113	25.5 (37.3)	13.4 (28.0)	141	14.0 (25.0)	7.7 (19.2)
Alcohol problems	66	51.9 (38.1)	39.7 (36.6)	121	20.1 (29.5)	15.7 (25.5)	141	16.4 (27.5)	12.9 (23.6)
School problems	35	58.2 (40.5)	27.5 (33.2)	98	13.6 (27.5)	5.6 (14.9)	141	5.6 (16.7)	2.5 (10.3)
Forest issues	74	59.6 (34.8)	32.3 (34.4)	121	26.8 (32.7)	14.0 (23.6)	141	19.9 (27.7)	10.6 (18.9)

We asked SHG members whether they obtained what they requested thanks to their collective actions ("solution") or, at least, received the promise that a solution was to be provided ("promise"). The columns (1) show summary statistics for wards where at least one SHG undertook collective actions for the issue. The columns (2) show the percentages over all the wards where the problem appeared (we asked SHGs whether they faced the problem in their ward). Finally, the columns (3) assume that all the problems appeared in all the wards. Standard deviations are given in parentheses.

Column (2) might underestimate the impact of SHGs, and yet the figures are still remarkable. The data suggest that undertaking action for alcohol issues led to a solution in one fifth of the

[23] Examples of successful stories are a replacement of the school teacher, the prohibition of alcohol brewed by outsiders, the reparation of a well, the obtainment of a widow pension or below the poverty line card, etc.

wards where the problem appeared.[24]

Therefore, despite some obvious limitations, we believe to be providing reliable evidence about the positive impact of collective actions by socially disadvantaged women.

6 Conclusions

We examine the impact of SHGs' collective actions on the variety of problems dealt with by local governments. Using a theoretical model, we show that an elected official, whose aim is to maximise re-election chances, would exert higher effort in providing public goods when private citizens undertake collective action and coordinate their voluntary contributions towards the same. This occurs although government and private contributions are assumed to be perfect substitutes. We test the predictions of the model using first-hand data on SHGs in India. We find that WMs take care of a larger variety of ward issues when SHGs undertake collective actions, and that they start dealing with the public goods preferred by SHGs. In particular, WMs are more likely to deal with alcohol, forestry and school problems.

Our results are important in light of the attention given to SHGs in anti-poverty programs in India. For example, the National Rural Livelihood Mission puts forward the creation of groups as a first step in its poverty alleviation program. As shown by Desai and Joshi (2014), SHGs help overcoming the barriers to collective actions imposed by traditions and social pressure. We complement their findings by providing evidence that this effort is recognized by local authorities and affect their behavior.

An additional and interesting research question is whether the phenomena we observe are related or not to the financial role of SHGs. Potentially, similar outcomes could be attained by different types of groups. However, this should not lead to understatements on the role of microfinance in India. In the context of our survey region, where the social role of women is restrained, intra-household interactions may play an important role. In this respect, the explicit financial aim

[24]This increase is remarkable as we know that WMs barely dealt with alcohol issues before SHGs were created (see Table 3).

of SHGs can make the difference by providing a socially acceptable reason for women to meet regularly.

References

Anderson, S. and Baland, J.-M. (2002). The economics of roscas and intrahousehold resource allocation. *The Quarterly Journal of Economics*, 117(3):963–995.

Angelucci, M., Karlan, D., and Zinman, J. (2014). Microcredit impacts: Evidence from a randomized microcredit program placement experiment by Compartamos Banco. *NBER Working Paper No. 19827*.

Babu, B. and Kar, S. (2010). Domestic violence in Eastern India: Factors associated with victimization and perpetration. *Public Health*, 124(3):136–148.

Baland, J.-M., Somanathan, R., and Vandewalle, L. (2008). Microfinance lifespans: A study of attrition and exclusion in self-help groups in India. *India Policy Forum*, 4(1):159–210.

Banerjee, A. and Duflo, E. (2007). The economic lives of the poor. *The Journal of Economic Perspectives*, 21(1):141–167.

Banerjee, A., Duflo, E., Glennerster, R., and Kinnan, C. (2013). The miracle of microfinance? Evidence from a randomized evaluation. *NBER Working Paper No. 18950*.

Bergstrom, T., Blume, L., and Varian, H. (1986). On the private provision of public goods. *Journal of Public Economics*, 29(1):25–49.

Chattopadhyay, R. and Duflo, E. (2004). Women as policy makers: Evidence from a randomized policy experiment in India. *Econometrica*, 72(5):1409–1443.

Chowdhury, M., Mosley, P., and Simanowitz, A. (2004). The social impact of microfinance: Introduction. *Journal of International Development*, 16(3):291–300.

Crépon, B., Devoto, F., Duflo, E., and Parienté, W. (2014). Estimating the impact of microcredit on those who take it up: Evidence from a randomized experiment in Morocco. *MIT Department of Economics Working Paper No. 14-14*.

Deininger, K. and Liu, Y. (2009). Economic and social impacts of self-help groups in India. *World Bank Policy Research Working Paper 4884*.

Desai, R. M. and Joshi, S. (2014). Collective action and community development: Evidence from self-help groups in rural India. *World Bank Economic Review*, 28(3):492–524.

Duflo, E. (2012). Women empowerment and economic development. *Journal of Economic Literature*, 50(4):1051–1079.

Edlund, L., Haider, L., and Pande, R. (2005). Unmarried parenthood and redistributive politics. *Journal of the European Economic Association*, 3(1):95–119.

Edlund, L. and Pande, R. (2002). Why have women become left-wing? The political gender gap and the decline in marriage. *The Quarterly Journal of Economics*, 117(3):917–961.

Feigenberg, B., Field, E., and Pande, R. (2013). The economic returns to social interaction: Experimental evidence from microfinance. *Review of Economic Studies*, 80(4):1–25.

Lott, J. and Kenny, L. (1999). Did women's suffrage change the size and scope of government? *The Journal of Political Economy*, 107(6):1163–1198.

Lundberg, S. and Pollak, R. A. (1993). Separate spheres bargaining and the marriage market. *Journal of Political Economy*, 101(6):988–1010.

Mishra, A. K. (1999). Tribal women against liquor. *Economic and Political Weekly*, 34(19):1089–1091.

NABARD (2013). *Status of Micro Finance in India 2011-2012*. Mumbai, www.nabard.org.

Neufeld, K., Peters, D., Rani, M., Bonu, S., and Brooner, R. (2005). Regular use of alcohol and tobacco in India and its association with age, gender, and poverty. *Drug and Alcohol Dependence*, 77(3):283–291.

Panda, P. and Agarwal, B. (2005). Marital violence, human development and women's property status in India. *World Development*, 33(5):823–850.

PRADAN (2005). *Group Dynamics: Promoting Women's Self-Help Groups Amongst the Rural Poor*. Delhi.

Rao, V. (1997). Wife-beating in rural South India: A qualitative and econometric analysis. *Social Science & Medicine*, 44(8):1169–1180.

Roberts, R. (1984). A positive model of private charity and wealth transfers. *Journal of Political Economy*, 92(1):136–148.

Warr, P. (1982). Pareto optimal redistribution and private charity. *Journal of Public Economics*, 19(1):131–138.

Xaxa, J. (2010). Grama panchayat in Orissa. *Orissa Review*.

Appendix A: Ward problems Classification

Public infrastructure: This category includes both reparation and construction of facilities such as tube wells, water pumps, roads, etc.

Alcohol problems: This category includes all problems related to excessive alcohol consumption and illegal production.

School problems: The central government launched the National Program of Nutritional Support to Primary Education (NP-NSPE) to introduce cooked midday meals for all children in primary government schools. Several problems can arise in terms of quality of the services. Other examples of school problems are complaints about the teachers and sanitation.

Forestry issues: They mainly involve the protection of forest, e.g., against illegal cutting down trees to sell the wood.

Welfare schemes: These are governmental programs aiming at helping disadvantaged parts of the population. These include Below the Poverty Line cards (BPL), Mahatma Gandhi National Rural Employment Guarantee Act cards (MGNREGA), Indira Awaas Yojana housing scheme (IAY), Indira Gandhi National Old Age Pension Scheme (IGNOAPS), National Maternity Benefit Scheme (NMBS), and Ration shops (PDS).

Other issues: Miscellaneous category including different specific issues like, for example, relocation of stone crusher machines or closing down of particular companies.

Appendix B: Theoretical Proofs

Proof. of Lemma 1: Comparing (9) and (10), we see that the marginal utility of the elected official's labour contribution towards the public good will be greater under collective action if and only if

$$n^{\beta}\left(\frac{ml_m+n}{\alpha n+\beta n}\right)^{(\alpha+\beta-1)}\left(\frac{m}{\alpha n+\beta n}\right)>\left(\frac{ml_m+n}{\alpha n+\beta}\right)^{(\alpha+\beta-1)}\left(\frac{m}{\alpha n+\beta}\right)$$

$$
\begin{aligned}
&\implies n^{\beta}\left(\frac{1}{\alpha n+\beta n}\right)^{(\alpha+\beta-1)}\left(\frac{1}{\alpha n+\beta n}\right) > \left(\frac{1}{\alpha n+\beta}\right)^{(\alpha+\beta-1)}\left(\frac{1}{\alpha n+\beta}\right)\\
&\implies n^{\beta}\left(\frac{1}{\alpha n+\beta n}\right) > \left(\frac{1}{\alpha n+\beta}\right)\\
&\implies n^{\beta-1} > \frac{\alpha+\beta}{\alpha n+\beta}\\
&\implies \frac{1}{n^{1-\beta}} > \frac{\alpha+\beta}{\alpha n+\beta}
\end{aligned}
$$

□

Proof. of Proposition 1: First, let us consider the case $\beta_m = 0$. Let us denote by l_m^0 the elected official's optimal level of effort when the community does not undertake collective action. Then, the following condition, obtained by substituting $\beta_m = 0$ into (11), must hold at $l_m = l_m^0$ when the community does not undertake collective action:

$$\alpha_m \omega (x_m)^{\alpha_m - 1} = \Psi \pi' (.) \sum_{i=1}^{n} \frac{dU_i}{dl_m} \tag{22}$$

According to Lemma 1, if $\frac{1}{n^{1-\beta}} > \frac{\alpha+\beta}{\alpha n+\beta}$, then $\frac{dU_i}{dl_m}|_{l_m = l_m^0}$ is higher under collective action. By Assumption 1, $\pi'(.)$ is unaffected by collective action. Then, at $l_m = l_m^0$, the left-hand side of (22) is smaller than the right-hand side under collective action. Since the elected official's optimisation problem is globally concave, it follows that his optimal level of effort under collective action is greater than l_m^0.

Next, let us consider the case where $\beta_m > 0$. The first-order condition can be written as

$$\alpha_m \omega (x_m)^{\alpha_m - 1} - \beta_m m \theta (x_m)^{\alpha_m} (y)^{\beta_m - 1} = \Psi \pi' (.) \sum_{i=1}^{n} \frac{dU_i}{dl_m} \tag{23}$$

Comparing (3) and (7), we see that any given value of l_m, y is higher under collective action. Therefore, at $l_m = l_m^0$, the right-hand side of (23) may not be larger than the left-hand side under collective action. However, if Ψ is sufficiently large, then the right-hand side of (23) will exceed the left-hand side at $l_m = l_m^0$ under collective action. Then, the reasoning from the case $\beta_m = 0$ would again apply and the official's optimal level of effort under collective action is greater than l_m^0. □

Proof. of Lemma 2: For ease of notation in the following analysis, let us first define two constants as follows:

$$
\begin{aligned}
A_h &= (\omega\alpha)^{\alpha} (\theta\beta_{1h})^{\beta_{1h}} \left(\theta\beta_{2f}\right)^{\beta_{2h}}\\
A_f &= (\omega\alpha)^{\alpha} \left(\theta\beta_{2f}\right)^{\beta_{2f}} (\theta\beta_{1h})^{\beta_{1f}}
\end{aligned}
$$

Absence of Collective Action: Using (13) and (14), we can compute that, in the absence of

collective action by women (the detailed steps are provided in Appendix C), we have

$$\left(\frac{\partial U_h}{\partial l_{1m}} - \frac{\partial U_h}{\partial l_{2m}}\right) = U_h\left[\left(\frac{\alpha m + \beta_{1h} m}{m l_{1m} + n_h}\right) - \left(\frac{\beta_{2h} m}{m l_{2m} + n_f}\right)\right] \tag{24}$$

$$\left(\frac{\partial U_f}{\partial l_{2m}} - \frac{\partial U_f}{\partial l_{1m}}\right) = U_f\left[\left(\frac{\alpha m + \beta_{2f} m}{m l_{2m} + n_f}\right) - \left(\frac{\beta_{1f} m}{m l_{1m} + n_h}\right)\right] \tag{25}$$

where

$$U_h = \left(\frac{m l_{1m} + n_h}{\alpha n_h + \beta_{1h}}\right)^{(\alpha+\beta_{1h})} \left(\frac{m l_{2m} + n_f}{\alpha n_f + \beta_{2f}}\right)^{\beta_{2h}} A_h \tag{26}$$

$$U_f = \left(\frac{m l_{2m} + n_f}{\alpha n_f + \beta_{2f}}\right)^{(\alpha+\beta_{2f})} \left(\frac{m l_{1m} + n_h}{\alpha n_h + \beta_{1h}}\right)^{\beta_{1f}} A_f \tag{27}$$

Therefore, using (17), we can obtain the following condition for the elected official's optimal choice:

$$\frac{U_h}{U_f} = \frac{\hat{n}_f}{\hat{n}_m}\left[\left(\frac{\alpha m + \beta_{2f} m}{m l_{2m} + n_f}\right) - \left(\frac{\beta_{1f} m}{m l_{1m} + n_h}\right)\right]\left[\left(\frac{\alpha m + \beta_{1h} m}{m l_{1m} + n_h}\right) - \left(\frac{\beta_{2h} m}{m l_{2m} + n_f}\right)\right]^{-1} \tag{28}$$

We obtain, from (26), (27) and (28),

$$\frac{U_h}{U_f} = \left(\frac{m l_{1m} + n_h}{\alpha n_h + \beta_{1h}}\right)^{(\alpha+\beta_{1h}-\beta_{1f})} \left(\frac{m l_{2m} + n_f}{\alpha n_f + \beta_{2f}}\right)^{\beta_{2h}-\beta_{2f}-\alpha} \frac{A_h}{A_f} \tag{29}$$

Presence of Collective Action: Using (15) and (16), we can compute that, in the presence of collective action (the detailed steps are provided in Appendix C), we have

$$\left(\frac{\partial U_h}{\partial l_{1m}} - \frac{\partial U_h}{\partial l_{2m}}\right) = U_h\left[\left(\frac{\alpha m + \beta_{1h} m}{m l_{1m} + n_h}\right) - \left(\frac{\beta_{2h} m}{m l_{2m} + n_f}\right)\right] \tag{30}$$

$$\left(\frac{\partial U_f}{\partial l_{2m}} - \frac{\partial U_f}{\partial l_{1m}}\right) = U_f\left[\left(\frac{\alpha m + \beta_{2f} m}{m l_{2m} + n_f}\right) - \left(\frac{\beta_{1f} m}{m l_{1m} + n_h}\right)\right] \tag{31}$$

where

$$U_h = \left(\frac{m l_{1m} + n_h}{\alpha n_h + \beta_{1h}}\right)^{(\alpha+\beta_{1h})} \left(\frac{m l_{2m} + n_f}{\alpha + \beta_{2f}}\right)^{\beta_{2h}} A_h \tag{32}$$

$$U_f = \left(\frac{m l_{2m} + n_f}{\alpha + \beta_{2f}}\right)^{(\alpha+\beta_{2f})} \left(\frac{m l_{1m} + n_h}{\alpha n_h + \beta_{1h}}\right)^{\beta_{1f}} A_f \tag{33}$$

Therefore, using (17), the optimal choice requires that

$$\frac{U_h}{U_f} = \frac{\hat{n}_f}{\hat{n}_m}\left[\left(\frac{\alpha m + \beta_{2f} m}{m l_{2m} + n_f}\right) - \left(\frac{\beta_{1f} m}{m l_{1m} + n_h}\right)\right]\left[\left(\frac{\alpha m + \beta_{1h} m}{m l_{1m} + n_h}\right) - \left(\frac{\beta_{2h} m}{m l_{2m} + n_f}\right)\right]^{-1} \tag{34}$$

We obtain, from (32), (33) and (34),

$$\frac{U_h}{U_f} = \left(\frac{ml_{1m}+n_h}{\alpha n_h+\beta_{1h}}\right)^{(\alpha+\beta_{1h}-\beta_{1f})} \left(\frac{ml_{2m}+n_f}{\alpha+\beta_{2f}}\right)^{\beta_{2h}-\beta_{2f}-\alpha} \frac{A_h}{A_f} \tag{35}$$

Comparing (29) and (35), it is clear that, for given l_{1m} and l_{2m} and $\beta_{2f} > \beta_{2h}$, the ratio of utilities is smaller under collective action if $n_f > 1$. Therefore, if l'_{1m} and l'_{2m} satisfies (34) in the absence of collective action, we have

$$\frac{U_h}{U_f} < \frac{\hat{n}_f}{\hat{n}_m}\left[\left(\frac{\alpha m+\beta_{2f}m}{ml_{2m}+n_f}\right)-\left(\frac{\beta_{1f}m}{ml_{1m}+n_h}\right)\right]\left[\left(\frac{\alpha m+\beta_{1h}m}{ml_{1m}+n_h}\right)-\left(\frac{\beta_{2h}m}{ml_{2m}+n_f}\right)\right]^{-1} \tag{36}$$

in the presence of collective action. The left-hand side of (36) is increasing in l_{1m} and decreasing in l_{2m}. The right-hand side of (36) is decreasing in l_{2m} and increasing in l_{1m}. Therefore, if l''_{1m}, l''_{2m} solves (34) and $l''_{1m}+l''_{2m} = l'_{1m}+l'_{2m}$, then we must have $l'_{2m} > l''_{2m}$ and $l'_{1m} < l''_{1m}$. □

Lemma 3. *Assume that the elected official maximises a weighted sum of utilities of the electorate, applying the same weight to individuals of the same gender, and the total amount of the elected official's labour available for the two public goods is fixed. Assume also that men undertake collective action in the provision of public good* 1*. Under Assumptions 2 and 3, if women organise to take collective action in the provision of public good* 2*, the elected official shifts labour from public good* 1 *to public good* 2*, compared to the situation where they do not.*

Proof. We assume in the following that men undertake collective action in contributing to Public Good 1. Following the reasoning in Sections 3.2.1 and 3.2.2, it can be shown that the utility levels of the community members in the absence of collective action by women is given by

$$\begin{aligned} U_h(x_h,y_1,y_2) &= \left(\frac{ml_{1m}+n_h}{\alpha n_h+\beta_{1h}}\right)^{\alpha+\beta_{1h}} \left(\frac{ml_{2m}+n_f}{\alpha+\beta_{2f}}\right)^{\beta_{2h}} (\omega\alpha)^{\alpha} (\theta\beta_{1h})^{\beta_{1h}} (\theta\beta_{2f})^{\beta_{2h}} \\ U_f(x_f,y_1,y_2) &= \left(\frac{ml_{2m}+n_f}{\alpha+\beta_{2f}}\right)^{\alpha+\beta_{2f}} \left(\frac{ml_{1m}+n_h}{\alpha n_h+\beta_{1h}}\right)^{\beta_{1f}} (\omega\alpha)^{\alpha} (\theta\beta_{2f})^{\beta_{2f}} (\theta\beta_{1h})^{\beta_{1f}} \end{aligned}$$

and the utility levels of the community members in the presence of collective action by women is given by

$$\begin{aligned} U_h(x_h,y_1,y_2) &= \left(\frac{ml_{1m}+n_h}{\alpha+\beta_{1h}}\right)^{\alpha+\beta_{1h}} \left(\frac{ml_{2m}+n_f}{\alpha+\beta_{2f}}\right)^{\beta_{2h}} (\omega\alpha)^{\alpha} (\theta\beta_{1h})^{\beta_{1h}} (\theta\beta_{2f})^{\beta_{2h}} \\ U_f(x_f,y_1,y_2) &= \left(\frac{ml_{2m}+n_f}{\alpha+\beta_{2f}}\right)^{\alpha+\beta_{2f}} \left(\frac{ml_{1m}+n_h}{\alpha+\beta_{1h}}\right)^{\beta_{1f}} (\omega\alpha)^{\alpha} (\theta\beta_{2f})^{\beta_{2f}} (\theta\beta_{1h})^{\beta_{1f}} \end{aligned}$$

Then, following the reasoning provided in the proof of Lemma 2, we can show that the elected

official's optimal choice requires

$$\frac{U_h}{U_f} = \left(\frac{ml_{1m}+n_h}{\alpha+\beta_{1h}}\right)^{(\alpha+\beta_{1h}-\beta_{1f})} \left(\frac{ml_{2m}+n_f}{\alpha n_f+\beta_{2f}}\right)^{\beta_{2h}-\beta_{2f}-\alpha} \frac{A_h}{A_f}$$

if women do not undertake collecive action, and

$$\frac{U_h}{U_f} = \left(\frac{ml_{1m}+n_h}{\alpha+\beta_{1h}}\right)^{(\alpha+\beta_{1h}-\beta_{1f})} \left(\frac{ml_{2m}+n_f}{\alpha+\beta_{2f}}\right)^{\beta_{2h}-\beta_{2f}-\alpha} \frac{A_h}{A_f}$$

if women do undertake collective action. Comparing the two equations, it is clear that, for given l_{1m} and l_{2m} and $\beta_{2f} > \beta_{2h}$, the ratio of utilities is smaller under collective action if $n_f > 1$. Then, following the reasoning in the proof of Lemma 2, we can show that if l'_{1m} and l'_{2m} satisfies (18) in the absence of collective action, and l''_{1m}, l''_{2m} solves (18) in the presence of collective action, we must have $l'_{2m} > l''_{2m}$ and $l'_{1m} < l''_{1m}$. □

Proof. of Proposition 2: The first-order condition's from the elected official's optimisation problem can be written as follows:

$$(y_2)^{\beta_{2m}}\left[\alpha_m\omega(x_m)^{\alpha_m-1}(y_1)^{\beta_{1m}} - \beta_{1m}m\theta(x_m)^{\alpha_m}(y_1)^{\beta_{1m}-1}\right] = \Psi\hat{\pi}'(.)\left[\hat{n}_h\frac{dU_h}{dl_{1m}} + \hat{n}_f\frac{dU_f}{dl_{1m}}\right] \quad (37)$$

$$(y_1)^{\beta_{1m}}\left[\alpha_m\omega(x_m)^{\alpha_m-1}(y_2)^{\beta_{2m}} - \beta_{2m}m\theta(x_m)^{\alpha_m}(y_2)^{\beta_{2m-1}}\right] = \Psi\hat{\pi}'(.)\left[\hat{n}_h\frac{dU_h}{dl_{2m}} + \hat{n}_f\frac{dU_f}{dl_{2m}}\right] \quad (38)$$

$$\begin{aligned} &\beta_{1m}m\theta(x_m)^{\alpha_m}(y_1)^{\beta_{1m}-1}(y_2)^{\beta_{2m}} - \beta_{2m}m\theta(x_m)^{\alpha_m}(y_1)^{\beta_{1m}}(y_2)^{\beta_{2m-1}} \\ = \;& \Psi\hat{\pi}'(.)\left[\hat{n}_f\left(\frac{dU_f}{dl_{2m}} - \frac{dU_f}{dl_{1m}}\right) - \hat{n}_h\left(\frac{dU_h}{dl_{1m}} - \frac{dU_h}{dl_{2m}}\right)\right] \end{aligned} \quad (39)$$

Let us denote by $l^*_{xm}, l^*_{1m}, l^*_{2m}$, the elected official's optimal choice in the absence of collective action by women.

(i) Let us first consider the case where $\beta_{1m} = \beta_{2m} = 0$. It can be shown that, for any given values of l_{1m}, l_{2m}, the terms $\frac{dU_h}{dl_{1m}}$ and $\frac{dU_f}{dl_{1m}}$ are higher when women undertake collective action as compared to when they do not. Therefore, the right-hand side of (37) is higher when women undertake collective action (note that, under Assumption 4, the term $\hat{\pi}'(.)$ is constant). Moreover, if $\beta_{1m} = \beta_{2m} = 0$, then the expression on the left-hand side of (37) is the same whether or not women undertake collective action. It follows at $l_{xm} = l^*_{xm}, l_{1m} = l^*_{1m}, l_{2m} = l^*_{2m}$, the left-hand side of (37) is smaller than the right-hand side when women undertake collective action. Therefore, we must have either $l_{1m} > l^*_{1m}$ or $l_{2m} > l^*_{2m}$ (or both) when undertake collective action.

If $\beta_{1m} = \beta_{2m} = 0$, then the left-hand side of (39) is equal to zero whether or not women undertake collective action. If $l_{1m} > l^*_{1m}$ and $l_{2m} \leq l^*_{2m}$, then following the reasoning in the proof of Lemma 2 (in the case that men do not undertake collective action) or Lemma 3 (in the case that men do undertake collective action), the right hand-side of (39) is greater than zero. Therefore, we

can rule out the possibility that the elected official's optimal labour allocation involves $l_{1m} > l_{1m}^*$ and $l_{2m} \leq l_{2m}^*$ when women undertake collective action. It follows that the elected official's optimal choice must involve $l_{2m} > l_{2m}^*$ when women undertake collective action.

(ii) Next, let us consider the case where $\beta_{1m}, \beta_{2m} > 0$. Then, for any given values of l_{xm}, l_{1m} and l_{2m}, the expression on the left-hand side of (37) is also higher when women undertake collective action as compared to when they do not. However we can show that, at $l_{xm} = l_{xm}^*, l_{1m} = l_{1m}^*, l_{2m} = l_{2m}^*$, for Ψ sufficiently large, the left-hand side of (37) is, again, smaller than the right-hand side when women undertake collective action. Therefore, we must have either $l_{1m} > l_{1m}^*$ or $l_{2m} > l_{2m}^*$ (or both) when women undertake collective action. Similarly, if $\beta_{1m}, \beta_{2m} > 0$, the expression on the left-hand side of (39) is also higher when women undertake collective action. But, once again, if $l_{1m} > l_{1m}^*$ and $l_{2m} \leq l_{2m}^*$, the expression on the right-hand of (39) will exceed the left-hand side for Ψ sufficiently large. It follows that, for Ψ sufficiently large, the elected official's optimal choice must involve $l_{2m} > l_{2m}^*$ when women undertake collective action. □

7 Appendix C: Derivations used in Proof of Lemma 2

In this appendix, we show in detail the steps for deriving equations (24)-(25) and (30)-(31). We make use of the following constants in computing the elected official's marginal utility of effort.

$$\begin{aligned} A_h &= (\omega\alpha)^{\alpha} (\theta\beta_{1h})^{\beta_{1h}} \left(\theta\beta_{2f}\right)^{\beta_{2h}} \\ A_f &= (\omega\alpha)^{\alpha} \left(\theta\beta_{2f}\right)^{\beta_{2f}} (\theta\beta_{1h})^{\beta_{1f}} \end{aligned}$$

Using (13) and (14), we find that, in the absence of collective action, we have

$$\begin{aligned} \frac{\partial U_h}{\partial l_{1m}} &= \left(\frac{m}{\alpha n_h + \beta_{1h}}\right)(\alpha + \beta_{1h}) \left(\frac{m l_{1m} + n_h}{\alpha n_h + \beta_{1h}}\right)^{(\alpha+\beta_{1h}-1)} \left(\frac{m l_{2m} + n_f}{\alpha n_f + \beta_{2f}}\right)^{\beta_{2h}} A_h \\ \frac{\partial U_f}{\partial l_{1m}} &= \left(\frac{m}{\alpha n_h + \beta_{1h}}\right)(\beta_{1f}) \left(\frac{m l_{2m} + n_f}{\alpha n_f + \beta_{2f}}\right)^{(\alpha+\beta_{2f})} \left(\frac{m l_{1m} + n_h}{\alpha n_h + \beta_{1h}}\right)^{(\beta_{1f}-1)} A_f \end{aligned}$$

$$\begin{aligned} \frac{\partial U_h}{\partial l_{2m}} &= \left(\frac{m}{\alpha n_f + \beta_{2f}}\right)(\beta_{2h}) \left(\frac{m l_{1m} + n_h}{\alpha n_h + \beta_{1h}}\right)^{(\alpha+\beta_{1h})} \left(\frac{m l_{2m} + n_f}{\alpha n_f + \beta_{2f}}\right)^{(\beta_{2h}-1)} A_h \\ \frac{\partial U_f}{\partial l_{2m}} &= \left(\frac{m}{\alpha n_f + \beta_{2f}}\right)(\alpha + \beta_{2f}) \left(\frac{m l_{2m} + n_f}{\alpha n_f + \beta_{2f}}\right)^{(\alpha+\beta_{2f}-1)} \left(\frac{m l_{1m} + n_h}{\alpha n_h + \beta_{1h}}\right)^{\beta_{1f}} A_f \end{aligned}$$

Therefore,

$$\begin{aligned}\left(\frac{\partial U_h}{\partial l_{1m}}-\frac{\partial U_h}{\partial l_{2m}}\right) &= U_h\left[\left(\frac{\alpha m+\beta_{1h}m}{\alpha n_h+\beta_{1h}}\right)\left(\frac{ml_{1m}+n_h}{\alpha n_h+\beta_{1h}}\right)^{-1}-\left(\frac{\beta_{2h}m}{\alpha n_f+\beta_{2f}}\right)\left(\frac{ml_{2m}+n_f}{\alpha n_f+\beta_{2f}}\right)^{-1}\right]\\ &= U_h\left[\left(\frac{\alpha m+\beta_{1h}m}{ml_{1m}+n_h}\right)-\left(\frac{\beta_{2h}m}{ml_{2m}+n_f}\right)\right]\end{aligned}$$

Similarly,

$$\left(\frac{\partial U_f}{\partial l_{2m}}-\frac{\partial U_f}{\partial l_{1m}}\right)=U_f\left[\left(\frac{\alpha m+\beta_{2f}m}{ml_{2m}+n_f}\right)-\left(\frac{\beta_{1f}m}{ml_{1m}+n_h}\right)\right]$$

Using (15) and (16), we find that, in the presence of collective action, we have

$$\begin{aligned}\frac{\partial U_h}{\partial l_{1m}} &= \left(\frac{m}{\alpha n_h+\beta_{1h}}\right)(\alpha+\beta_{1h})\left(\frac{ml_{1m}+n_h}{\alpha n_h+\beta_{1h}}\right)^{(\alpha+\beta_{1h}-1)}\left(\frac{ml_{2m}+n_f}{\alpha+\beta_{2f}}\right)^{\beta_{2h}}A_h\\ \frac{\partial U_f}{\partial l_{1m}} &= \left(\frac{m}{\alpha n_h+\beta_{1h}}\right)(\beta_{1f})\left(\frac{ml_{2m}+n_f}{\alpha+\beta_{2f}}\right)^{\alpha+\beta_{2f}}\left(\frac{ml_{1m}+n_h}{\alpha n_h+\beta_{1h}}\right)^{(\beta_{1f}-1)}A_f\end{aligned}$$

$$\begin{aligned}\frac{\partial U_h}{\partial l_{2m}} &= \left(\frac{m}{\alpha+\beta_{2f}}\right)(\beta_{2h})\left(\frac{ml_{1m}+n_h}{\alpha n_h+\beta_{1h}}\right)^{(\alpha+\beta_{1h})}\left(\frac{ml_{2m}+n_f}{\alpha+\beta_{2f}}\right)^{(\beta_{2h}-1)}A_h\\ \frac{\partial U_f}{\partial l_{2m}} &= \left(\frac{m}{\alpha+\beta_{2f}}\right)(\alpha+\beta_{2f})\left(\frac{ml_{2m}+n_f}{\alpha+\beta_{2f}}\right)^{(\alpha+\beta_{2f}-1)}\left(\frac{ml_{1m}+n_h}{\alpha n_h+\beta_{1h}}\right)^{\beta_{1f}}A_f\end{aligned}$$

Therefore,

$$\begin{aligned}\left(\frac{\partial U_h}{\partial l_{1m}}-\frac{\partial U_h}{\partial l_{2m}}\right) &= U_h\left[\left(\frac{\alpha m+\beta_{1h}m}{\alpha n_h+\beta_{1h}}\right)\left(\frac{ml_{1m}+n_h}{\alpha n_h+\beta_{1h}}\right)^{-1}-\left(\frac{\beta_{2h}m}{\alpha+\beta_{2f}}\right)\left(\frac{ml_{2m}+n_f}{\alpha+\beta_{2f}}\right)^{-1}\right]\\ &= U_h\left[\left(\frac{\alpha m+\beta_{1h}m}{ml_{1m}+n_h}\right)-\left(\frac{\beta_{2h}m}{ml_{2m}+n_f}\right)\right]\end{aligned}$$

$$\begin{aligned}\left(\frac{\partial U_f}{\partial l_{2m}}-\frac{\partial U_f}{\partial l_{1m}}\right) &= U_f\left[\left(\frac{\alpha m+\beta_{2f}m}{\alpha+\beta_{2f}}\right)\left(\frac{ml_{2m}+n_f}{\alpha+\beta_{2f}}\right)^{-1}-\left(\frac{\beta_{1f}m}{\alpha n_h+\beta_{1h}}\right)\left(\frac{ml_{1m}+n_h}{\alpha n_h+\beta_{1h}}\right)^{-1}\right]\\ &= U_f\left[\left(\frac{\alpha m+\beta_{2f}m}{ml_{2m}+n_f}\right)-\left(\frac{\beta_{1f}m}{ml_{1m}+n_h}\right)\right]\end{aligned}$$

Appendix D: Maps

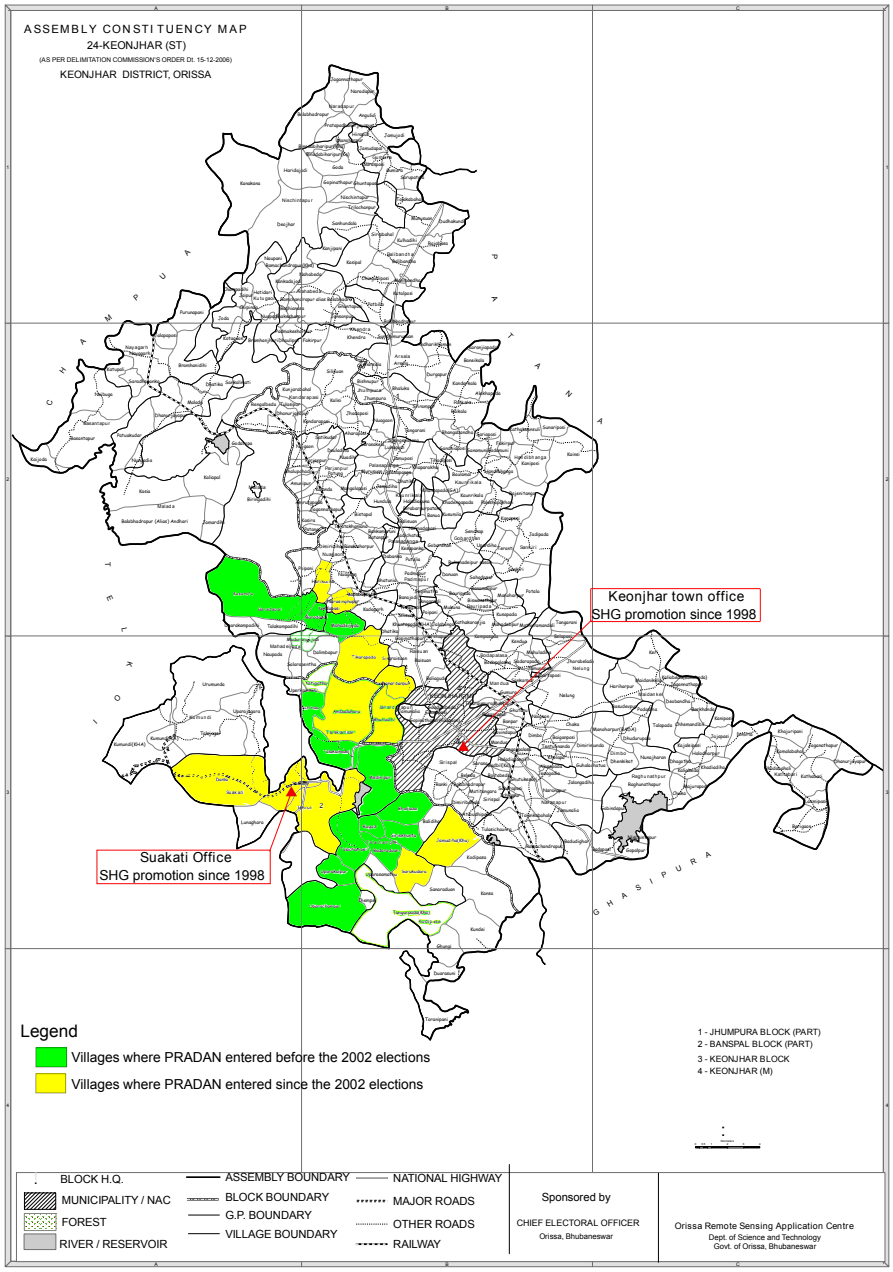

Figure 1: Keonjhar District: Banspal and Keonjhar Blocks

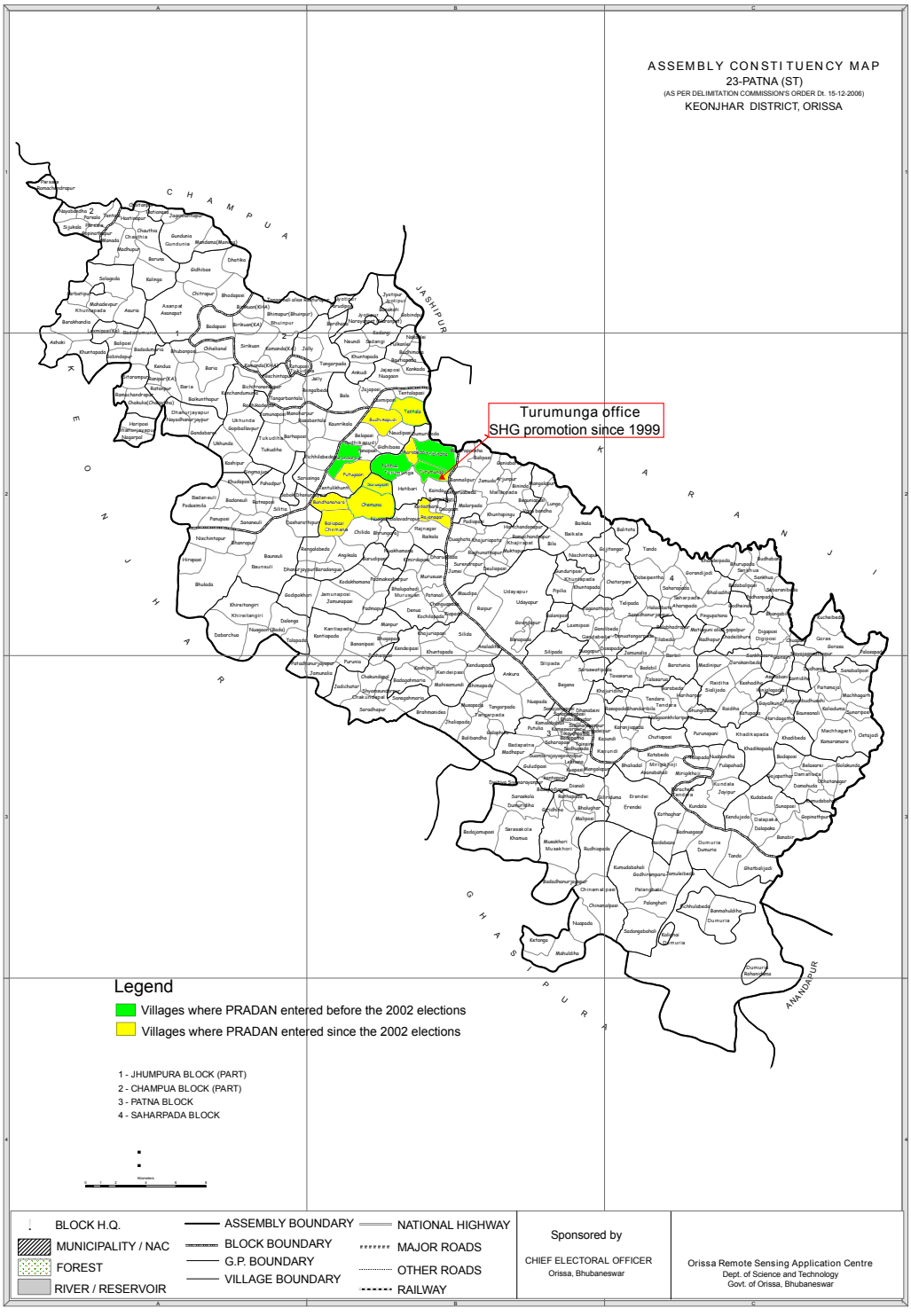

Figure 2: Keonjhar District: Patna Block

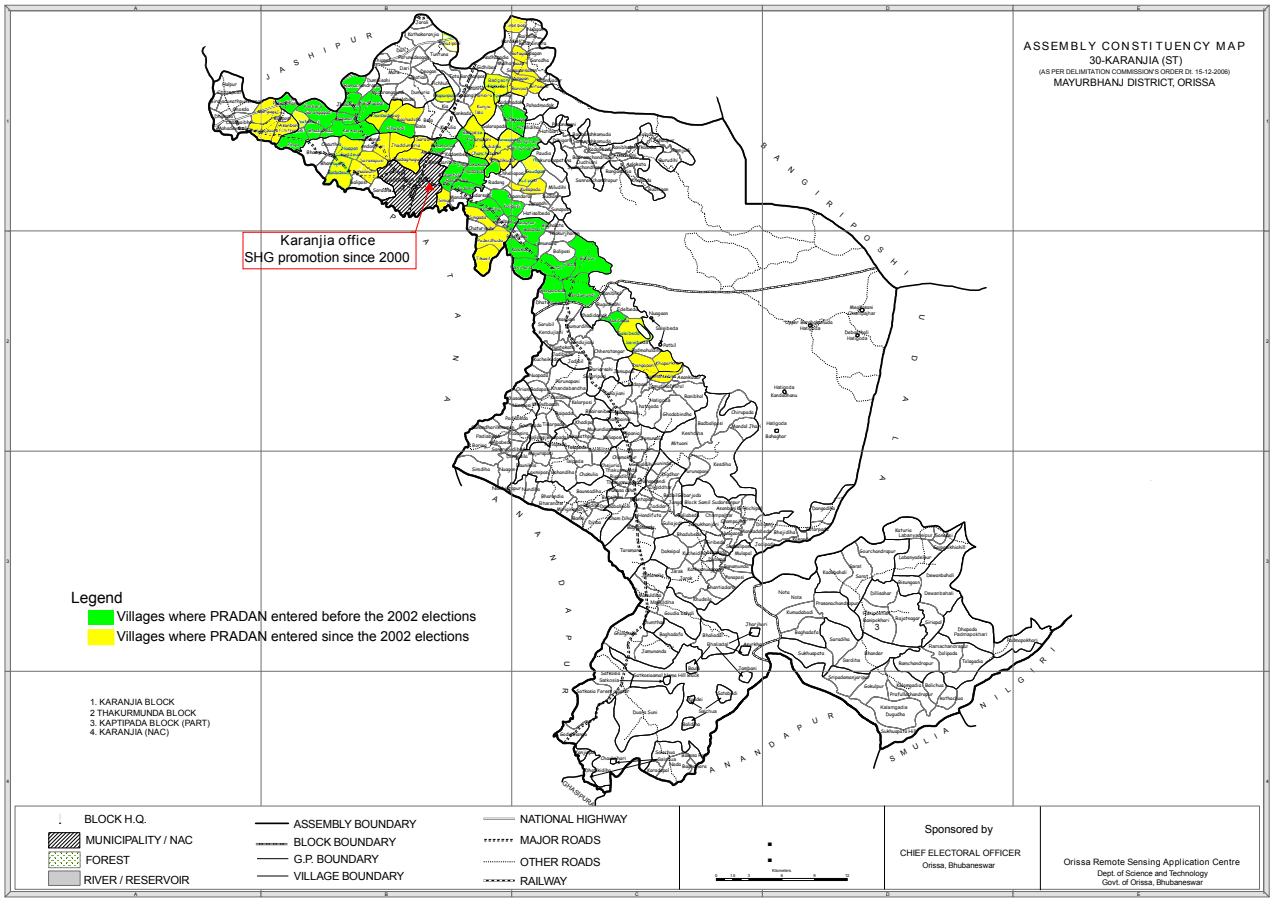

Figure 3: Mayurbhanj District: Karanjia Block

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