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Article

Community Participation and the Quality of Rural Infrastructure in Ethiopia

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Abstract

Ethiopia's Productive Safety Net Programme (PSNP) is one of the world's largest food security programmes. The programme supports chronically food insecure rural households and at the same time promotes long-term food security through the creation of rural infrastructure. While studies on the PSNP have examined various features of the programme, there is limited knowledge on the quality and durability of infrastructure built through the programme. Ensuring and maintaining the quality of local public goods built through the PSNP and similar social protection programmes is a costly and recurring issue. Motivated by the long-term objective of the programme, this paper analyses the role played by a key design feature of the PSNP, that is, its Community-Based Participatory Watershed Development approach in influencing a project's physical condition and its operational status. The paper is based on survey data and technical assessments provided by soil and water conservation (SWC) engineers covering a sample of 249 SWC projects located in 53 watershed communities. The survey is complemented by qualitative information gathered through interviews and discussions. The location of multiple projects, with differing levels of participation in the same watershed communities, permits estimation of the effects of community participation after controlling for community fixed effects. We find that projects in which beneficiaries play a larger role in project monitoring and evaluation are substantially less likely to be damaged and in better operational condition. These results support the idea that community participation translates into more durable infrastructure.

Keywords: Productive Safety Net Programme, community participation, quality rural infrastructure, Ethiopia

JEL classification: O12, O13, O18

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1. Introduction

Since the mass famine in 1983–84, Ethiopia has tried different measures to tackle deep-rooted poverty. These range from regular annual food aid to emergency food assistance. The latter has been delivered either as payments for public works (PWs) or direct support (DS). Though these measures have been successful in averting mass starvation, they have not yet banished the threat of further food insecurity. Keeping this in mind, recent efforts have focused on the promotion of rural livelihoods by building local infrastructure assets through different food security programmes (FSPs) (MoARD, 2010).

In 2003, the government initiated a consultation with development partners for an alternative to the existing emergency response of channelling food aid to fill consumption gaps. This alternative was aimed at supporting the needs of chronically food insecure households while at the same time developing long-term solutions to tackle the root causes of food insecurity. The process ended by proposing an FSP, which encompassed a shift from an emergency relief system to sustainable food security. This programme was formally launched in January 2005 with the name Productive Safety Net Programme or PSNP (Gilligan *et al.*, 2009). The PSNP has three inter-connected objectives: first, to protect beneficiaries against hunger by providing cash and/or food during periods of food shortage; second, to prevent further impoverishment by protecting the sale of household assets; and third, to promote sustainable livelihoods by building local infrastructure assets. While the first two objectives may be classified as short term, the third objective is related to the long-term solution of addressing the problems of food insecurity (Devereux *et al.*, 2006).

Unlike preceding interventions, the PSNP programme has several distinguishing features. First, there is a distinction between DS and PW beneficiaries. The former includes vulnerable but labour constrained households who receive support from the programme but are not expected to provide any labour contribution, while the latter are expected to provide time and help build community assets. Second, according to MoARD (2005), natural resource degradation in general and soil erosion and drying up of water sources in particular are the root causes behind declining agricultural production, which eventually leads to poverty and food insecurity. Consistent with this analysis, natural resource management using soil conservation and flood control structures and water harvesting and water conservation projects are the most important components of the PWs projects implemented under PSNP. Finally, in order to achieve its long-term objectives of creating and maintaining quality local rural infrastructure assets, the programme has adopted a so-called Community-Based Participatory Watershed Development (CBPWD) approach that requires active participation of the community in the overall programme cycle. As is by now quite widely known, the aim of such community-based development initiatives is to reverse the traditional top-down approach and allow beneficiaries (the community) to participate in all aspects of watershed development by involving them in the selection, implementation, management and maintenance of projects.

Since its inception, the PSNP has attracted a large body of empirical work. A number of these studies have evaluated the targeting efficacy of the PSNP (Nigussa and Mbrengwa, 2009); its impact on assets, food security and consumption, diversification (for example, Knippenberg and Hoddinott, 2017; Mohamed, 2017; Béné *et al.*, 2012; Hoddinott *et al.*, 2012; Berhane *et al.*, 2011; Andersson *et al.*, 2011; Gilligan *et al.*, 2009); and its unintended

but positive impact on emission of greenhouse gases (Woolf *et al.*, 2018; Woolf *et al.*, 2015).[1] While the results vary across studies, depending on the district and the region under scrutiny, the literature tends to suggest that the PSNP has had a positive effect on a range of outcomes, including enhancing household resilience to covariate shocks and asset accumulation.[2] The construction of durable and quality rural infrastructure underpins the realisation of the long-term objectives of the PSNP, and although there are a wide range of studies on the programme, the effect of the programme, and in particular its participatory approach on rural infrastructure, is still awaited.

Motivated by the long-term objective of the programme and its participatory approach, the current study aims at analysing the effectiveness of community participation in determining the quality and durability, as measured by project damage and project operational status, of local public goods built through the PSNP. In particular, the study provides the following: (i) an assessment of the extent of community participation in various project-related decisions, (ii) an assessment of the condition of community assets in terms of project damage and operational status and (iii) an examination of the effect of community participation in determining the condition of assets built through the PSNP.

The paper draws on primary data collected from 249 rural projects constructed between 2005 and 2013, which are located in 53 watershed communities in four food insecure districts

1 Based on data collected from twenty-four PSNP districts located in six PSNP regions (Afar, Amhara, Oromia, Somali, SNNPR and Tigray), Woolf *et al.* (2018) estimate the emission of greenhouse gases in districts covered and not covered by the PSNP. Using summary statistics and two-sided *t*-tests, they find that sites covered by the PSNP emit far less greenhouse gases as compared to those without. They argue that the reduction in GHG in PSNP areas may be attributed to the soil and water conservation activities of the PSNP, which have resulted in better land management and reduced land degradation.

2 Knippenberg and Hoddinott (2017) examine the effect of the PSNP on mitigating the effects of drought. Using survey data from multiple years, they find that PSNP payments lead to a reduction in the initial impact of drought on food security by 57% and an elimination of the adverse drought impact within 2 years. Based on an analysis of cross section data from 160 households located in a food insecure district, Mohamed (2017) finds that the PSNP has a positive and significant effect on food consumption but no effect on income. Béné *et al.* (2012) use panel data from 2006 and 2008 and conclude that the effect of the PSNP is limited and not strong enough to completely protect beneficiaries against the impacts of severe shocks. Using Ethiopian Food Security Surveys collected in 2006, 2008 and 2010, Hoddinott *et al.* (2012) conclude that household access to the PSNP and Other Food Security Programmes and the Household Asset Building Programme has led to increased use of fertiliser as well as enhanced investments in agriculture. Berhane *et al.* (2011) compare the effect of longer-term (5 years) and short-term (1 year) participation in the public works programmes on livestock holdings and report that longer participation raises livestock holdings by 0.38 tropical livestock units. Andersson *et al.* (2011) use three rounds of panel data (2002, 2005, 2007) from one of the country's regions to examine the impact of the PSNP on household holdings of livestock and trees. They find that while the PSNP has a positive impact on tree holdings there is no impact on livestock holdings. Gilligan *et al.* (2009) use cross-section data collected 18 months after the launch of the PSNP to examine the impact of the PSNP and other safety net programmes (OSNP) on a range of household economic outcomes. They find that the PSNP on its own is not very effective but in combination with the OSNP there is a positive impact on food security, enhanced use of improved agricultural technologies and greater probability of operating non-farm business activities. However, there is no evidence of increased asset accumulation.

located in Ethiopia's Oromia region—a region where the PSNP is particularly active. Due to the focus of the PSNP, attention is restricted to soil and water conservation (SWC) structures. Data were collected through a field survey which included beneficiary self-assessment as well as on-site observations and assessments by SWC engineers. The surveys were augmented with qualitative data gathered using key informant interviews (KIIs) and focus group discussions (FGDs).

To preview our results, we find a high degree of participation ranging from 72% to 83% across twelve participation decisions with substantial variations in participation rates across the four districts. The variation in participation across districts parallels variations in project outcomes with project damage ranging from 25% in districts with high participation to 50% in districts with low levels of participation. The empirical approach that exploits the availability of multiple projects located in the same watershed community to identify the effect of community participation shows that community participation in project monitoring and evaluation plays a substantial role in enhancing the physical and operational state of projects. For instance, some of the estimates suggest that 50% of the gap in project damage across districts may be attributed to differences in participation in monitoring and evaluation. With regard to what drives variation in participation within a watershed community, our exploratory analysis shows that recent PSNP entrants and greater awareness of the CBPWD are correlated with greater participation. This is consistent with the greater emphasis on participation, which has been emphasised in later phases of the PSNP.

The remainder of the paper is organised as follows. Section 2 provides a review of the theory and empirical evidence on the role of community participation in development interventions. Section 3 provides details on the PSNP and its PWs component. Section 4 outlines the data and methodology. Section 5 discusses the findings while the final section concludes.

2. Community participation—Theory and evidence

In the past two decades, driven by disenchantment with centralised modes of governance, waves of decentralisation have occurred in countries covering half the world's population (Bardhan and Mookherjee, 2006) and large sums of money (Mansuri and Rao, 2013) have been ploughed into poverty-alleviation projects, which directly involve project beneficiaries (the community) in some or all aspects of project design, implementation and management. This trend has been motivated by the perception that a centralised government breeds corruption and rent-seeking and is unaccountable. Decentralisation of control over resources and divestment of authority to local governments coupled with community participation has been offered as an approach to enhance beneficiary targeting, foster the adoption of projects that are more closely aligned to local preferences and improve service delivery and reduce corruption.[3] Notwithstanding these expectations, theoretically, there is no guarantee that such outcomes will occur (Waller *et al.* 2002).

3 While there are several flavours of community participation with different monikers and different levels of community involvement, two broad approaches are discernible. These are community-based development (CBD) that refers to development projects that actively involve beneficiary communities in decisions related to design and management and community-driven development (CDD) that goes beyond CBD and involves communities in the allocation and management of funds (Mansuri and Rao, 2004: 1–2).

Arguments in favour of decentralisation and community participation centre around the role of local information in leading to more informed decisions and through the provision of agency, voice and control to project beneficiaries, a stronger link between allocation of funds and local preferences. Such control and preference matching may be expected, among other outcomes, to lead to more durable and better-maintained community assets (Finsterbusch and Van Wicklin, 1987; Mansuri and Rao, 2013: 182; Nkwake, 2013). However, it is also possible that due to 'local capture', development outcomes will continue to mirror or perhaps worsen as compared to a more centralised system as bureaucratic and political power moves downward (Platteau and Gaspart, 2003; Dasgupta and Beard, 2007).

The theoretical debates on the relative merits of decentralisation and community participation have fostered a large empirical literature, which has been comprehensively reviewed by Mansuri and Rao (2013). Their report focuses on three issues, namely, evidence of local elite capture, the role of participation in strengthening civil society and most pertinently, for the current paper, the impact of participation on development outcomes including the quality of local infrastructure. Compared to the range of studies on various dimensions of participation, the literature on the role of participation in determining the quality of local infrastructure is quite thin. Only a handful of studies have explored the link between participation and the quality of PWs infrastructure. These include Narayan (1995), Prokopy (2005), a pair of studies by Khwaja (2004, 2009) and Mansuri (2012).

Based on a global study of evaluation reports covering 121 rural water supply projects in 49 developing countries, Narayan (1995) concluded that overall beneficiary participation throughout the project cycle (design to maintenance) was a significant factor in ensuring overall project effectiveness and success.[4] Overall project effectiveness and success was generated by using factor analysis of twenty performance indicators. The analysis was based on cross-section data and relied on multivariate regression analysis using a score of participation (one indicating zero participation and seven indicating high participation in decision making as well as control of resources) as the main explanatory variable. The quantitative analysis was combined with systematic qualitative analysis of some selected cases. Although the study is innovative in terms of attempting to examine the effect of participation on project outcomes, the paper's use of factor analysis and an overall measure of participation makes it impossible to identify the effect of a specific participation decisions on a specific project outcome.

Building on Narayan (1995), Prokopy (2005) explored the relationship between five project outcomes and two measures of participation—beneficiary contribution to the capital cost of projects and household involvement in decision making.[5] Based on cross-section data

4 The projects were established by eighteen different agencies located in Asia, Africa and Latin America. The evaluation reports for the study report were based on impact assessments carried out by experienced evaluators.

5 The five outcome variables are the percentage of households (i) reporting satisfaction with the new project, (ii) that have paid tariffs, (iii) stated that access to water is more equal, (iv) reporting time savings and (v) who think that the village can sustain the system for 10 years. The participation variables are the percentage of households that have contributed to the capital cost of the project and household involvement in decision making who are aware of project prior to its construction, attended planning meeting, participated in more than one decision, supervised construction work,

collected from World Bank-assisted water supply and sanitation projects in 45 villages in two Indian states, the author showed that both measures of participation significantly enhance three out of the five outcomes (village level satisfaction, equal access to water and time savings) based on which the author recommends encouraging both measures of participation. The author admits the existence of reverse causality between participation and project outcomes and attempts to address this concern by using pre-project participation measures. However, four of the five outcomes remain susceptible to reverse causation. Furthermore, the outcomes used in the paper are mainly subjective.

Based on cross-section data analysis of 132 infrastructure projects in 99 rural communities located in Northern Pakistan, Khwaja (2004, 2009)[6] finds that projects constructed by the government, which implies lower levels of participation, have a maintenance score that is 23.6 percentage points lower (implying maintenance is less likely to have been carried out) than NGO-initiated projects. Highlighting the importance of community capacity, the paper finds that communities are better able to maintain projects that are less complex and which are being refurbished as compared to new projects. An interesting twist is the finding that community participation in non-technical decisions is associated with a 55 percentage point increase in maintenance score while greater community participation in technical decisions is associated with a 39 percentage point reduction in the maintenance score. The author also finds that there is a U-shaped relationship between greater inequality in project returns and maintenance. That is, as inequality increases, there is a decline in the extent to which project maintenance needs are met but increases beyond a certain threshold as high levels of inequality indicate that the project has effectively been privatised.

Mansuri (2012) extends Khwaja's work by examining the link between community participation and project outcome quality using cross-section data on 230 infrastructure projects located in 80 villages in three of Pakistan's largest provinces. Half the projects in the sample were constructed through Pakistan's National Rural Support Programme (NRSP), which adopts a participatory approach, while the remainder were constructed by the concerned government departments. Design and construction and current condition and maintenance are the main outcomes assessed in the study. Mansuri (2012) finds that participatory projects are better designed and constructed as compared to projects constructed without substantial community participation. Similar to Khwaja (2009), the study finds that such projects are also better maintained. The paper argues that this may be due to NRSP's approach to project maintenance where such costs are included as part of project costs at the proposal stage although the community is responsible for project maintenance. On a negative note, Mansuri (2012) finds that the distribution of project benefits is not sensitive to project type and regardless of whether a project has been constructed through the NRSP or government line departments, the share of marginalised groups in accessing project benefits is far less than their share in the population.

A recent narrative synthesis of the effect of community-driven development (CDD) projects on various outcomes including the quantity and quality of infrastructure is provided

attended post-construction meeting and the percentage of households that have contributed to the project cost.

6 The 2009 study includes only sixty-four of the projects located in thirty-three communities in Baltistan North Pakistan.

by White *et al.* (2018).[7] A unique element is that the report draws on the grey literature and compiles evidence from programme documents, process evaluations and qualitative research papers. The authors conclude that CDD projects have led to substantial increases in the quantity of small-scale infrastructure although in terms of their (technical) quality, the evidence is mixed and varies across countries. Similarly, effects on most welfare outcomes (health, education) are insignificant except in the case of the effect of improved water supply on time savings.

While the studies discussed above look directly at the effect of community participation on project outcomes, a point emerging from these studies is a community's capacity in maintaining project quality. A related strand of the literature examines this aspect directly and concludes that the inability of communities to maintain projects is not an indictment of the participatory approach but a failure to provide adequate post-construction financial and technical support. For instance, based on their global review of water projects, Katz and Sara (1997) argue that inadequate technical support is one of the main reasons for project failure. Isham and Kähkönen (2002) reach a similar conclusion on the basis of their analysis of water projects in India, Indonesia and Sri Lanka. Echoing this conclusion, in their impact evaluation of the Bolivian social find, Newman *et al.* (2002) find that water projects were associated with increases in water quality only if communities also received training. An interesting study that examines the long-term sustainability of participatory rural water pipeline schemes in Malawi is provided by Kleemeier (2000). Based on an examination of 12 schemes, which were constructed 3 to 26 years prior to the time she conducted her analysis, Kleemeier finds that about half the schemes are not functioning well. She goes on to conclude that participatory community organisations are capable of managing relatively small schemes but do not have the technical and management capacity to handle larger schemes. Although not explicit, in their review, White *et al.* (2018) do not indict the CDD approach but suggest that the poor quality of infrastructure projects may be attributed to poor supervision, poorly qualified contractors and engineers and insufficient capacity of implementing agencies.

As far as the PSNP programme is concerned, soon after its commencement, MoARD (2006) conducted a review of the PWs programme. While the report pointed out variations in project quality perhaps linked to differences in implementation capacity, the main conclusion was that most projects implemented through the PSNP, especially roads, irrigation and water supply projects, have failed to meet minimum technical standards. While there have been no attempts to examine the impact of these projects on economic outcomes, in their review of social protection programmes in Ethiopia, Devereux and Guenther (2009) expect that the economic impact of such PSNP constructed assets is likely to be negligible. It is likely that the limited attention paid to the quality of PWs in the initial years of the programme may have been driven by an immediate focus on other programme objectives. In any case, a necessary condition for project returns is adequate project quality and maintenance, which in turn calls for an investigation of whether the community-based approach used in the PSNP programme has any bearing on such outcomes.

7 The study is based on twenty-five impact evaluations of twenty-three programmes implemented in twenty-one low and middle income countries.

3. The PSNP—A brief overview

The PSNP programme, which operates in food insecure districts of the country, has been operating since January 2005 and is currently in its third phase (2015/16–2019/20).[8] This phase builds on the efforts of the first phase and second phase and stresses the achievement of the programme's objectives by forging links between the PSNP and other FSPs (MoARD, 2010). Currently, the programme covers 319 food insecure districts or about 40% of the country's districts (MoA, 2013; Woolf *et al*., 2018; UNICEF, 2016). The main objectives of the programme remain unchanged and the focus is on shifting the trend from meeting short-term food needs through emergency relief, to addressing the underlying causes of food insecurity. As discussed by Devereux and Guenther (2009), the three main objectives are to protect households by providing resources to smooth consumption during the dry season, protect households by preventing sales of household assets and reduce the probability of borrowing and finally promote livelihoods by building community assets with development potential. In 2013/14, the year before the data for this study was collected, the programme had a cash budget of about $205 million and access to food resources to the tune of 274,844 metric tonnes and provided social transfers to about 6 million food insecure individuals either through 'PWs' activities (4.8 million) or as 'DS' (1.2 million) for labour constrained households (MoA, 2013).

Beneficiaries of the PW component are expected to undertake PWs activities in six major areas—these are SWC/water harvesting, construction of rural feeder roads, bridges and fords, water supply for animal and human use, creation of social infrastructure (schools, health and animal posts), small scale irrigation activities and agricultural activities related to composting and farmers training. Among these categories, SWC/water harvesting is the dominant activity and accounts for more than 70% of the total PWs projects in most districts (MoARD, 2010). Project beneficiaries are expected to be involved in all elements of the PWs project cycle.

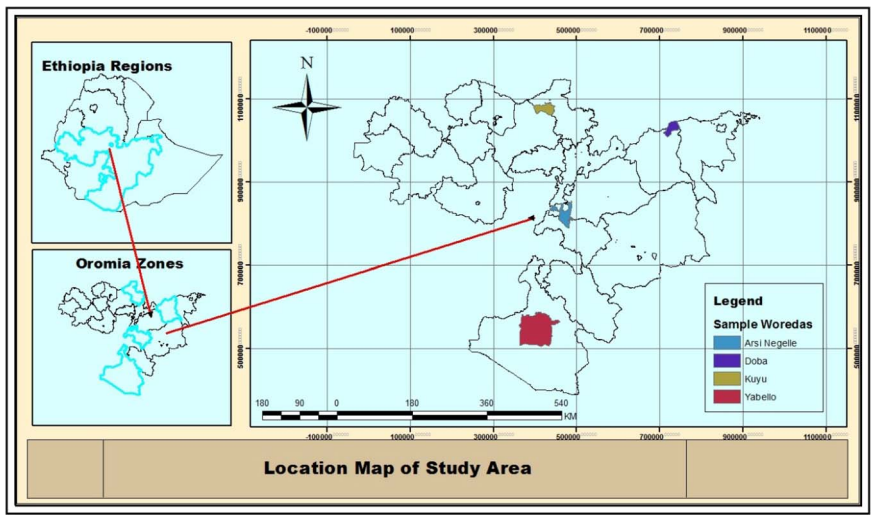
The overall approach is called CBPWD and the overarching objective of the participatory model is '. . . to generate greater cohesion within the society and enable its poorest members to benefit from the various assets created and eventually to overcome their food insecurity'. The project implementation manual contains a detailed guide on the steps that need to be followed to ensure community involvement from project inception, to implementation and maintenance. Based on the CBPWD guidelines, each watershed needs to form a Community Watershed Development Committee (CWSDC) and watershed residents need to participate in various activities. Based on the manual, four major categories of participation may be identified. These four participation categories are participation in planning and implementation, project usage and benefit distribution, maintenance and project monitoring and evaluation. Within each of these broad categories, there are several sub-categories and beneficiaries are expected to play a role in determining each of these outcomes. As is discussed in the next section, the data collection efforts were guided by the CBPWD and attempted to measure community participation in each of the four broad categories as well as various sub-categories.

8 A district is classified as food insecure on the basis of the frequency of requiring food assistance in the 10 years preceding 2004. Food insecure households within such districts are households who fail to produce enough to meet their consumption needs even when there is normal rainfall (MoARD, 2010: 8).

4. Data and empirical approach

4.1 Data

The study relies on data collected between August 2014 and January 2015 from four food insecure districts (Yabello, Kuyu, Arsi Negelle and Doba) located in Ethiopia's Oromia region.[9] Of the 319 districts where the PSNP operates, 25% are located in this region.[10] These 79 PSNP districts may be divided into three agro ecological climatic zones, that is, low altitude (kola), mid altitude (woynadega) and high altitude (dega). Some districts have features of all three agro-climatic zones. The three climatic zones (low, mid and high) account for about thirty, thirty-four and seven districts, respectively, of the total PSNP districts in the region while the remaining eight consists of districts with mixed features. In order to ensure representation of each agro-ecology in the sample, one district was randomly selected from each of the three climatic zones.[11] In addition, a fourth district that has mixed features was also selected. Map 1 indicates the location of the four sample districts. Given the predominance of natural resource—SWC/harvesting projects in the PSNP's portfolio, data collection was restricted to these two project categories.[12]



Map 1: Location of study districts.

9 The PSNP is very active in the region. The region accounts for close to 21% of all PSNP project beneficiaries.

10 The figures are based on the 2013/14 programme data.

11 Yabello was randomly selected from a group of thirty predominantly low altitude districts, Arsi Negelle from a group of thirty-four predominantly mid-altitude districts while Kuyu was picked from a group of seven predominantly high altitude districts. Doba belongs to the group of eight districts with mixed features.

12 Across the four districts, on average, soil and water conservation projects account for 73% of the annual person days spent on public works activities. In the four sample districts, the figure ranges from with a minimum of 65% in the case of Kuyu to a maximum of 79% in the case of Doba.

Subsequently, due to financial and logistical reasons, we decided to collect data from 20% or 17 of the 84 PSNP villages located in the four randomly chosen districts. Based on the share of each district in the total number of PSNP villages, we selected four, three, four and six villages to be surveyed from Yabello, Arsi Negelle, Kuyu and Doba districts, respectively. Within each village, based on the share of person days allocated for soil and water projects, we planned to gather information on about 15 (in the case of Kuyu and Yabello) and 20 (in the case of Arsi Negelle and Doba) SWC projects per village with an overall plan of covering 295 structures in the four districts. Due to logistical challenges the target could not be reached and the study is based on surveying 249 projects located in 17 villages spread over 53 watershed communities (see Table A1 for the distribution of planned versus actual surveyed villages in the four districts). The number of households residing in a watershed ranges between a minimum of 15 to a maximum of 300.

Given the nature of the PWs, two types of questionnaires were administered. The first, a collective questionnaire, was administered to a so-called structure response group (SRG), which consisted of four to six beneficiaries. A total of 1,238 individuals participated in the 249 SRG.[13] To be part of the SRG, an individual had to be a resident of the watershed community and a participant in the PWs programme. Individuals were randomly selected from a list of PWs beneficiaries available at the watershed community level and randomly assigned to an SRG. The SRG questionnaire gathered information on watershed community traits (number of households in the watershed, access to public facilities) project characteristics (type, age, new or refurbished), formation of the CWSDC and information on current operational and physical status of the project. Immediately after the collective survey, an individual-level survey was administered to each of the SRG participants. This survey was used to gather information on the main explanatory variable, community participation—defined as whether the household or its members have participated in twelve project decisions. Consistent with the guidelines in the CBPWD, these decisions were categorised into four major types of participation—planning and implementation, project usage and benefit distribution, maintenance and monitoring and evaluation. In addition, the individual survey gathered information on individual and household characteristics, perceptions of PSNP and CBPWD and existing social interactions between and within watershed communities.

The responses of the SRG on the operational and physical status of individual projects were supplemented by a technical survey conducted by SWC engineers. These six engineers, each with more than 6 years of experience with the technical guidelines prescribed in the CBPWD manuals and the author visited each of the projects and measured their condition in terms of their physical damage and functional status.

The qualitative data collection included eight KIIs—two in each district and one FGD in each of the 17 villages (kebeles) where the SRG and individual surveys were administered.[14] The discussions and interviews revolved around the implementation of the PWs component

13 Of these 1,238 individuals, 52% were female. Except for 21 groups (8%), all the SRGs have at least one female member. With regard to age, 67% of the respondents were between the ages of 30 and 50 followed by 20% with above 50 years of age and 13% were between the ages of 16 and above but less than 30 years.

14 The key informants were usually heads of the agriculture office and village administrators or their representatives.

of the PSNP, views on the relationship between the administrative officials and beneficiaries and reasons for participation or non-participation in PWs project decisions.

4.2 Empirical approach

A necessary condition for the PSNP to be part of a solution to the country's food security concerns is that infrastructure projects built through the programme should be of adequate quality. Construction of durable assets is vital for the realisation of the long-term objective of the PSNP. Consistent with this line of argument, the main outcome variable used in this paper is the extent of a project's physical damage as determined by on-site visits conducted by engineers. While it is subjective, we also use information provided by the engineers on the functional status of a project.

Physical condition was rated on a five-point scale ranging from undamaged to severely damaged as well as in terms of the percentage of a project that was damaged.[15] Engineers provided estimates in terms of the percentage of a project that was damaged and a response based on the five-point scale while the SRG provided an estimated based only on a five-point scale. Operational status was defined in terms of a three-point scale (fully operational, partially operational, non-operational) and is a measure of the extent to which a project meets the purpose for which it is intended. Accordingly, we treat the two outcome variables (Y) for project i located in watershed community j as a function of, project characteristics (P) and community participation in project decisions ($Part$), ε_{ij} is an unobserved error term. That is,

$$Y_{ij} = \lambda + P_{ij}\eta + Part_{ij}\mu + \varepsilon_{ij}. \quad (1)$$

P_{ij} includes project specific characteristics such as project type (soil conservation/water harvesting), age, mode of construction, that is, completely new or extension of an existing project). $Part_{ij}$ in (1) includes four measures of participation—that is, participation in planning and implementation, project usage and benefit distribution, maintenance and monitoring and evaluation. Each of these four measures indicates the share of households in an SRG that participated in each of the participation decisions.[16] Although not shown in (1), the specification also contains a set of four district dummies.

Several concerns may arise while using (1) to estimate the effect of participation on outcomes. First, it is possible that communities with certain unobserved traits, for instance, greater social cohesion may be more likely to participate. At the same time social cohesion may also influence project outcomes, that is $Cov\ (Part_{ij},\varepsilon_{ij}) \neq 0$, and hence OLS estimates of (1) are likely to be biased. Second, (1) treats project outcomes as a function of participation. However, the reverse, that is, participation itself maybe a function of project outcomes cannot

15 The damage percentage variable is based on the extent of project damage. For instance, if there is a 5-m long stone bund and about 1 m is damaged then the damage percentage is recorded as 20%. Operational status provides an idea of the project's capacity to generate the expected benefits. The role of a stone bund is to provide protection against soil erosion and operational state is defined in relation to how well the project is performing in terms of preventing soil erosion.

16 For instance, if there are five members in a structure response group and three indicated that they participated in a planning decision, then participation in that decision is 60%. In the first instance, participation in each of twelve project decisions was computed in the manner just described and then aggregated into four participation decisions.

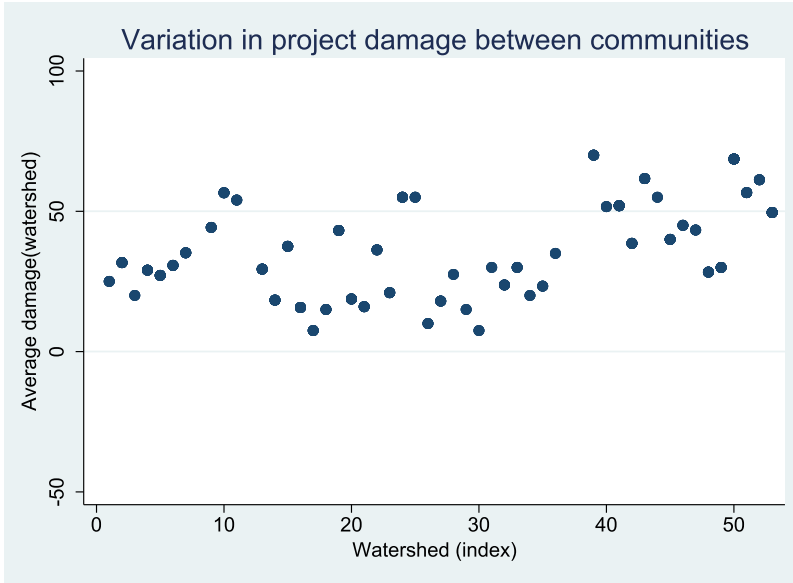


Figure 1: Variation in Average Project Damage between Watershed Communities. *Note*: The figure plots average project damage score (in percent) across the watershed communities based on engineers' measurements with differences across points representing differences in project damage between watershed communities.

be ruled out. For example, if a project is well constructed and yields clear benefits this in turn may lead to greater community participation in deciding how project benefits should be distributed and/or how a project should be maintained.

In order to deal with the first issue, in addition to estimating (1) that includes various community traits to absorb differences across communities, we estimate a model that includes watershed community-fixed effects and exploits variation in participation within a watershed community to identify effects. This is possible as in most of the watershed communities in the survey there are multiple projects (forty-nine of fifty-three communities) and this enables us to use variation in participation within the same watershed community to isolate the effect of participation on outcomes (see Figures 1 and 2). That is, we estimate

$$Y_{ij} = \lambda + P_{ij}\eta + Part_{ij}\mu + \theta_j + \varepsilon_{ij} \quad (2)$$

where θ_j is a watershed community fixed effect.[17]

17 The approach here is similar to Khwaja (2004, 2009) who utilises variation (inequality) in participation within a community to identify the effect of participation on project outcomes. The presence of more than two projects in 92% of the surveyed watersheds communities allows pursuing this approach. However, since the data used for this paper do not have good indicators for within watershed community (asset) inequality, unlike Khwaja (2009), we are unable to explore this aspect in the context of the PSNP. However, as will be discussed later in the text, we are able to show that variation in participation depends on duration of membership in the PSNP and awareness of the CBPWD approach.

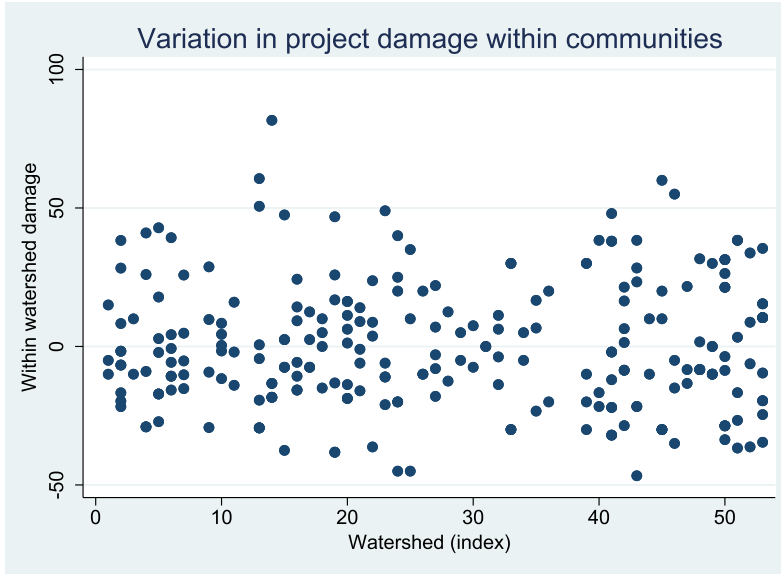


Figure 2: Variation in Project Damage within Watershed Communities. *Note*: The figure displays variation in project damage score within the watershed communities. That is, each point is obtained by subtracting the community mean damage from the damage score of each project within each community.

To deal with the second issue, we divide the measures of participation into those elements of participation that occur before project benefits start to flow, that is, participation in project planning and implementation and those that occur after the flow of project benefits. While the latter measures of participation are more likely to be influenced by reverse causality, for the former, this is unlikely. We estimate several variants of (1) and (2).

5. Results

5.1 Descriptive statistics—Project damage and participation

Tables 1 to 5 provide summary statistics of the variables used in the analysis. As displayed in Table 1, according to the engineers, the average project damage is 37% and about 55% of the projects are fully operational and generate the expected benefits. The average project is about 4.9 years old and 63% of the projects are meant for soil conservation. About half the projects are extensions to existing projects while the remainder are completely new. Table 2 examines the link between a project's physical status and its functional state. The bulk of the highly damaged projects are not functioning (seventy-two of seventy-seven). However, there is more variation in the other categories. Of the seventy-six projects that show very low levels of damage, twenty-one are not functioning. While this is surprising, the explanation provided by the engineers was that these projects are not badly damaged but they have operated long enough and are no longer yielding the expected benefits.

Community participation in different decisions and sub-decisions is quite high. As shown in Table 3, across the 12 decisions, participation ranges from 72% to 83%. Of a total of 1,238 households, 71% have participated in all four decisions at the planning stage. The corresponding figures are 73%, 71% and 78% for decisions relating to project usage and

Table 1: Description of Variables: SRG Level

Variable	Definition	Mean (std. dev.)
Project outcomes		
Project damage (%)	Share of project that is damaged	37.12 (28.14)
Project operational state	Fully operational = 1	0.55
Project characteristics		
Project make	Project is new or an extension, new = 1	0.50
Project type	Soil conservation projects = 1	0.63
Project age (years)	Number of years since project constructed	4.88 (2.15)
Community watershed characteristics		
Distance from the district town (km)	Distance of watershed from nearest (large) district town	19.97 (10.70)
School availability	Is there a primary/junior (secondary) school in the watershed, yes = 1	0.41
Access to water	Does the watershed have facility for potable water, yes = 1	0.31
Access to electricity	Does the watershed have access to electricity, yes = 1	0.09
Access to health facility	Does the watershed have health centre/facilities, yes = 1	0.23
Cultivable land size (hectares)	Total cultivable land size for all households in the watershed area	171.9 (127.9)
District		
Yabello	The district where the project is located	0.22
Kuyu		0.18
Arsi Negelle		0.18
Doba		0.42

Notes: $N = 249$

Table 2: Project Operational State and Damage State—Engineer Provided

Operational state	Damage state			Total
	Highly damaged (>50%)	Slight damage (25–50%)	Very little/undamaged (0–25%)	
Functioning	5	75	55	135
Not functioning	72	20	21	113
Total	77	95	76	248

benefit distribution, project maintenance and project monitoring and evaluation, respectively (Table 4). Breaking down the participation decisions into those that take place after and before project execution (Table 5) shows that 68% of the respondents participated in all eight post-project execution decisions while the figure is 71% for participation before project execution. The lack of substantial differences in participation rates before and after project execution suggests that participation is not driven by actual receipt of benefits. If this were the case then one would expect to find differences in participation rates before and after the project.

Table 3: Description of Variables and Means (Std. Dev.): Individual Level

Participation in planning	Response takes a value of 1, if a household or its members have participated in decision making in each of these 12 individual participation questions	0.79
Project type selection		0.77
Project site selection		0.81
Project scale (length, capacity)		0.77
Project timing		0.83
Project usage and benefit distribution		0.77
Project usage rules		0.78
Nature of sanctions on misuse		0.77
Benefits distribution		0.75
Maintenance		0.77
Maintenance system, rules and policy		0.76
Maintenance labour contribution		0.83
Sanctions for failure to contribute		0.72
Monitoring and evaluation		0.80
Project monitoring activities		0.79
Evaluation of the programme		0.81
Respondent's traits		
Female	Respondent is female	0.52
Age	Respondent's age in complete years	42.5 (12.9)
Religion	Respondent's religion, 1 = non-Muslim	0.43
Education level	Education level of the respondent	
No education		0.75
Primary education		0.23
Secondary and above education		0.02
Household size	Number of family members	6.2 (2.1)
Female headed household	Head of the household is female, yes = 1	0.26
Duration of membership	Number of years in the PSNP	2.9 (2.1)
Perception of PSNP and CBPWD		
PSNP addresses food insecurity	Do your trust that PSNP addresses your food security problems, yes = 1	0.95
PSNP well targeted	Do your think that PSNP is properly targeted (no problem in inclusion/exclusion), yes = 1	0.88
Aware of CBPWD	Are you aware of the CBPWD approach of the PSNP programme, yes = 1	0.24
Social Interactions		
Trust PSNP members	Do you trust PSNP beneficiaries more than non-beneficiaries? 1 = yes	0.18
Conflict between watershed communities	Have you ever experienced conflict/disagreement with regard to people living in different watershed? yes = 1	0.01
Conflict within watershed communities	Have you ever experienced conflict/disagreement with people living in the same watershed, yes = 1	0.03

Notes: N = 1,238

Table 6 delves deeper and examines district-specific patterns in project damage, project functional status, participation in project decisions and formation of the CWSDC. Project damage is substantially higher, a little above 50%, in two of the districts (Kuyu and Arsi

Table 4: Community Participation in Project Decisions

Number of decisions	Project planning	Project usage and benefit distribution	Project maintenance	Project monitoring and evaluation
0	159 (12.9)	234 (18.9)	178 (14.7)	219 (17.7)
1	57 (4.6)	63 (5.1)	104 (8.6)	53 (4.3)
2	70 (5.7)	33 (2.7)	68 (5.6)	962 (78)
3	75 (6.1)	907 (73.3)	862 (71.1)	-
4	872 (70.7)	-	-	-

N (%)

Table 5: Community Participation: Before and After Project Execution

Number of decisions	Before	After
0	159 (12.9)	102 (8.4)
1	57 (4.6)	95 (7.9)
2	70 (5.7)	36 (3.0)
3	75 (6.1)	26 (2.2)
4	872 (70.7)	16 (1.3)
5	-	21 (1.7)
6	-	28 (2.3)
7	-	65 (5.4)
8	-	820 (67.8)

N (%)

Negelle) as compared to the lower rates of damage in Doba (25.4%) and Yabello (37%). In terms of the operational status, 60% of the projects in Yabello are in good functional state as compared to a little below 50% in Kuyu. A little more than half the projects (54%) in Arsi Negelle and Doba have good functionality. There is marked variation in participation across districts. Almost all households participate in decision making across the 12 project decisions in Doba. Participation rates in Yabello are also high and range from a low of 75% to a high of 96%. In contrast, rates of participation in the other two districts are substantially lower and lie between 12% and 60% in Kuyu and between 51% and 75% in Arsi Negelle. Despite the marked differences in participation, community watershed committees have been formed in almost all locations. These patterns indicate that the presence of a committee does not automatically translate into participation.

Qualitative information obtained from focus group discussants underlines these district-specific differences.

The reflection from a discussant in one of the villages in Kuyu echoes the opposite:

> '. . . our participation in the public works is limited to doing what we are told to do by village officials. They tell us what activities we have to do, where and when to do it. Although we get transfers for six months in the year, we are called for different activities at any time of the year even outside the PWs implementation timing. We just follow their order since we do not want to risk [being] taken out of the program.' (Discussed in September 2014)

Table 6: Project Outcomes and Participation in Project Decisions by District

Project decision	District									
	Yabello		Kuyu		Arsi Negelle		Doba		Overall	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Project outcomes										
Project damage	36.8	82.2	50.8	27.1	50.5	29.2	25.4	25.8	37.1	28.1
Project functional status (1 = functional)	0.61		0.49		0.54		0.54		0.55	
Participation in project decision										
Before project implementation (planning) decisions (%)	**84.95**	**24.70**	**48.53**	**25.05**	**62.93**	**35.89**	**96.55**	**10.96**	**79.14**	**29.64**
Project type selection decision	75.18	33.36	44.89	29.89	61.74	38.83	97.88	7.84	76.70	33.31
Project site selection decision	87.54	26.48	49.67	31.12	65.22	36.86	97.69	8.95	80.81	30.85
Project scale selection decision	87.68	24.99	39.11	33.02	60.27	38.09	94.42	18.37	76.64	34.57
Project time frame selection decision	89.39	24.21	60.44	36.30	64.56	36.62	96.22	12.00	82.42	29.99
After project implementation decisions (%)	**89.21**	**20.58**	**39.54**	**31.53**	**57.44**	**37.93**	**97.66**	**7.63**	**77.89**	**32.99**
Use and benefit distribution decisions (%)	**89.66**	**22.12**	**31.11**	**37.69**	**57.21**	**38.72**	**98.74**	**5.61**	**76.88**	**36.46**
Project usage decision	91.88	18.91	37.33	39.68	56.30	41.81	98.85	6.39	78.28	36.03
Nature of sanctions for project misuse decision	88.01	25.32	29.33	37.32	62.61	36.90	98.72	5.45	77.24	36.34
Distribution of project benefit decision	89.10	24.88	26.67	40.68	52.72	42.58	98.85	6.64	75.11	39.60
Maintenance of project decisions (%)	**86.08**	**25.68**	**30.18**	**24.87**	**63.37**	**36.24**	**98.76**	**6.21**	**77.08**	**33.97**
Maintenance system, policy and rules	85.97	25.56	28.89	40.13	57.83	42.00	98.72	6.64	75.78	38.28
Labour contribution for maintenance decision	88.31	23.66	49.33	41.69	75.33	35.12	98.72	6.64	83.21	31.57
Nature of sanctions for failure to contribute in project maintenance	83.97	30.03	12.33	24.37	56.96	42.58	98.85	6.12	72.25	40.79
Project monitoring and evaluation (%)	**91.88**	**16.91**	**57.33**	**42.34**	**51.74**	**43.27**	**95.48**	**14.54**	**79.72**	**34.34**
Time-to-time project monitoring	88.17	24.79	54.89	43.52	52.61	43.69	95.10	15.64	78.48	35.73
Evaluation of project effectiveness	95.58	12.18	59.78	44.13	50.87	43.35	95.86	14.05	80.97	34.49
Community Watershed Committee Formed (1 = yes)	**0.83**		**0.80**		**0.93**		**0.92**		**0.88**	
Observations	54		45		46		104		249	

Notes: The participation variables indicate the share of group members who participated in a particular decision.

Information obtained from district level key informants also substantiates the differences found in the survey data. For instance, while discussing project participation, a district level key informant in Doba remarked

> '. . . the follow-up of beneficiaries on the PW projects is incredible. They do beyond what is expected as a PW beneficiary. They do see the benefit of their work and their work is acknowledged at different levels and it keeps them motivated.' (Interviewed on December 2014)

The perception by a key informant in Kuyu is quite different. While commenting on project participation the informant noted

> '. . . the public works participants in this village are not enthusiastic about their activities. They work just to fulfil their paid person days and not very caring about the quality of the infrastructure. There were times they left off uncompleted [SWC] structures just because they completed their person days.' (Interviewed September 2014)

Overall, there are clear differences in community participation across districts and *prima facie* it seems that project participation and project damage are correlated. The next section provides a more formal exploration of this link.

5.2 Participation and project outcomes

5.2.1 Project damage and participation

A graphical exploration of the relationship, based on locally weighted regressions, between each of the participation measures and project damage is provided in Figure 3. Across all the four decisions, increasing participation is clearly associated with a decline in project damage. Table 7 presents a series of estimates of equation (1) with each of the four participation measures included sequentially, followed by a specification, which includes all the measures. Individually, each of the participation measures is negatively associated with project damage but not statistically significant. Focusing on the most complete specification, two out of the four participation measures are negatively associated with project damage and the effect of participation in project monitoring and evaluation is statistically significant at the 5% level. The lack of precision in project usage and benefit distribution is not unexpected as participation in the various project decisions is highly correlated (see Table A2). Nevertheless, what is clear is that a 10 percentage point increase in community participation in project monitoring and evaluation is associated with about a 2 percentage point reduction in project damage. There are clear differences across districts with projects in Doba about 19 percentage points less likely to be damaged as compared to projects in other districts. The positive effect of participation in project monitoring and evaluation on project damage after controlling for district effects indicates that overall variations in project damage and project participation are not driven only by differences across districts but also by variation within districts.

Table 8 provides estimates of equation (2). This specification controls for watershed community effects and exploits variation within the 49 watershed communities, where there are multiple projects, to identify the effect of participation on project damage. The advantage of such a specification is that the effect of participation on project damage is not

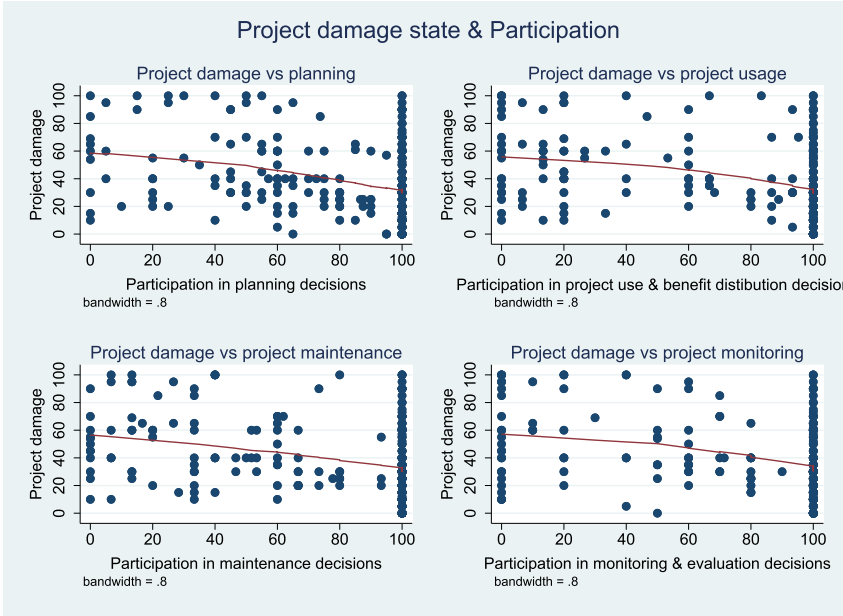


Figure 3: Project Damage State and Participation in Project Decisions. *Note*: The figure displays the relationship between project damage and four measures of participation.

contaminated by differences in characteristics across watershed (or district) communities in characteristics such as community leadership or community capacity. Similar to the results in Table 7, each of the individual measures of participation is negatively related to project damage although only participation in project monitoring and evaluation is statistically significant again at the 5% level. Based on the specification that includes the participation measures, it simultaneously shows that participation in monitoring and evaluation decisions is associated with a reduction in project damage. In terms of magnitude, a 10 percentage point increase in participation is associated with a 3.1 percentage point reduction in project damage.

These estimates indicate that if a watershed found in a district with low participation were to enhance participation in monitoring and evaluation to a high level—say from 57% in Kuyu to the level of participation in Doba (95%)—then project damage would decline by 12% or about 50% of the gap in project damage between the two districts may be attributed to differences in participation in monitoring and evaluation. These are large effects.

Elaborating on the record of high participation and better project outcome, an FGD participant from (Lega Lencha village) in Doba district narrates his case:

> 'We [The beneficiaries] were not really in to the projects the way we are now. We didn't follow the structures and just come only for the sake of attendance. Thanks to a former district level agriculture office head who changed the district's picture completely. What he did was he selected some PW beneficiaries (including myself) from different villages in the district and sent us on an experience sharing visit to a village called Abraha Wa Atsbha

Table 7: Project Damage and Participation—District Fixed Effects

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Planning	−0.12				0.12
	(0.06)				(0.18)
Project use and benefit distribution		−0.15			−0.22
		(0.14)			(0.21)
Project maintenance			−0.12		0.21
			(0.16)		(0.25)
Monitoring and evaluation				−0.15	−0.20**
				(0.08)	(0.06)
Kuyu	5.10**	0.37	2.50	4.41***	5.56
	(1.06)	(5.95)	(6.66)	(0.37)	(7.89)
Arsi Negelle	10.11***	7.87	10.08**	6.64*	4.76
	(1.12)	(3.76)	(3.04)	(2.64)	(2.76)
Doba	−15.31**	−15.60*	−15.45*	−16.32**	−18.55**
	(4.50)	(4.96)	(5.77)	(4.21)	(5.21)
Constant	58.51***	62.06***	58.74**	62.56***	60.03***
	(7.50)	(9.78)	(11.07)	(8.42)	(12.45)
Observations	243	243	243	243	243
Adj-Rsq	0.175	0.183	0.174	0.189	0.188

Notes: District clustered robust standard errors in parentheses; $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$; all specifications control for project specific characteristics (age, make and type).

Table 8: Project Damage and Participation—Watershed Fixed Effects

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Planning	−0.110				−0.019
	(0.097)				(0.143)
Project use and benefit distribution		−0.061			0.100
		(0.089)			(0.156)
Project maintenance			−0.052		0.108
			(0.081)		(0.154)
Monitoring and evaluation				−0.186**	−0.30[6]**
				(0.084)	(0.151)
Constant	50.60***	47.40***	46.69***	55.65***	50.32***
	(9.67)	(9.88)	(9.85)	(8.28)	(9.75)
Observations	240	240	240	240	240
Adj-Rsq	0.183	0.178	0.177	0.197	0.192

Notes: Watershed clustered robust standard errors in parentheses; $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$; all specifications control for watershed fixed effects and project specific characteristics (age, make and type).

in Tigray region which at the time had an outstanding performance on SWC. It was like 'Heaven in the middle of Hell!' Everything was green, fresh wind blowing and plantation on the revived land throughout. PW beneficiaries of the village shared their experience and trained us on building and maintaining SWC structures. We came back to our village with a different attitude towards the SWC structures. We took our turn of sharing what we saw

and training to other beneficiaries who did not get the chance of going there. Although the performance is not similar across the villages in Doba, we are proud that we are among the top performing districts in the region as well as the country. We now go to different PSNP districts all over the country to train others and others also come to our district to share our experience and get 'peer-to-peer' training.' (Discussed in December 2014)

Another participant of FGD in Dherito village in Yabello district discusses

'We learnt our lesson the hard way. In the previous regimes, our zone [Borena] was known for its huge livestock production. At the time we did not care much about the environment (soil and water degradation with its consequence on our small farming and animal fodder). We woke up very late but we are now trying our best to benefit as much as we can from the SWC structures. It is different when you learn it the hard way. You become result focused and concerned about the activities.' (Discussed in November 2014)

5.2.2 Project operational state and participation

Table 9 provides estimates of the effect of participation but this time with a project's operational status as the outcome variable. This variable is constructed as a binary variable that indicates whether the project is functioning well or not (includes partially operational and non-operational). As shown in Column 5 of the table, once again, increase in community participation in project use and benefit distribution and project monitoring and evaluation

Table 9: Project Functional State and Participation—District Fixed Effects

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Planning	0.0006				−0.0038
	(0.0005)				(0.0029)
Project use and benefit distribution		0.0018			0.0056
		(0.0021)			(0.0030)
Project maintenance			0.0007		−0.0054
			(0.0019)		(0.0027)
Monitoring and evaluation				0.0017	0.0035
				(0.0014)	(0.0017)
Kuyu	0.0061	0.0899	0.0268	0.0368	−0.0117
	(0.0432)	(0.0960)	(0.0815)	(0.0335)	(0.0502)
Arsi Negelle	−0.0429**	0.0020	−0.0398	0.0952	0.0601
	(0.0118)	(0.0544)	(0.0278)	(0.0397)	(0.0382)
Doba	0.0948	0.0857	0.0936	0.0952	0.1631*
	(0.0778)	(0.0873)	(0.0929)	(0.0757)	(0.0618)
Observations	243	243	243	243	243
Adj-Rsq	0.015	0.022	0.015	0.023	0.033

Notes: District clustered robust standard errors in parentheses; ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$; all specifications control for project specific characteristics.

Table 10: Project Functional State and Participation—Watershed Fixed Effects

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Planning	−0.0001				−0.002
	(0.002)				(0.003)
Project use and benefit distribution		0.0002			0.003
		(0.002)			(0.004)
Project maintenance			−0.001		−0.005
			(0.002)		(0.003)
Monitoring and evaluation				0.002	0.005**
				(0.002)	(0.002)
Observations	240	240	240	240	240
Adj-Rsq	0.030	0.030	0.031	0.034	0.034

Notes: Watershed clustered robust standard errors in parentheses; $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$; all specifications control for watershed fixed effects and project specific characteristics (age, make and type).

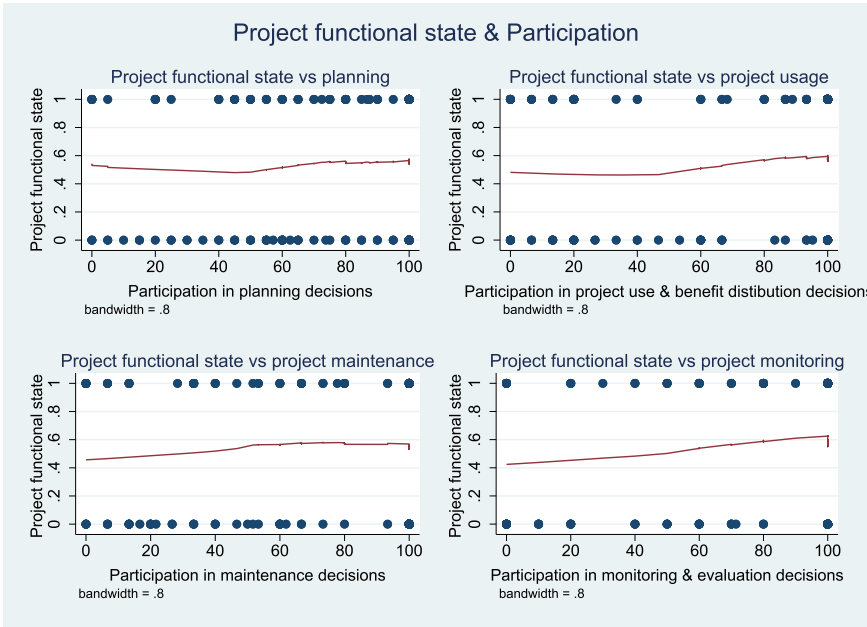


Figure 4: Project Functional State and Participation in Project Decisions. *Note*: The figure displays the relationship between project functional state and four measures of participation.

decisions increase the probability that a project is functioning well. The estimates from a linear probability model controlling for community watershed fixed effects in Table 10 yield a similar positive effect of participation in project monitoring and evaluation on a project's functional state. The positive, and relatively sharp, effect of participation in project monitoring and evaluation is also captured in Figure 4, which explores the bivariate

relationship between project functional state and participation based on a locally weighted regression.

5.3 Revisiting participation

The discussions in Sections 5.1 and 5.2 have revealed the positive effect of variation in participation (particularly participation in monitoring and evaluation) within watershed communities, on project outcomes. However, what determines variation in participation within communities? While the qualitative material presented in the previous sections provides some clues, in this section, we use the data at hand to explore the link between various traits and participation within watershed communities.

Table 11 presents OLS estimates of the correlates of project participation controlling for watershed fixed effects. Several aspects are noteworthy. For the most part, except for secondary education in the case of one of the participation decisions, variation in in the composition of the traits of the SRG does not have bearing on the participation. This is perhaps not unexpected as variations in such traits within a community may be limited. What does stand out is that an increase in the duration of membership in the PSNP programme reduces participation. Specifically, a 1-year increase in PSNP membership is associated with reductions in the probability of participation in project planning, project use rule and benefit distribution and project maintenance decisions by 2.8, 1.9 and 2.6 percentage points, respectively. This might look surprising, however, the information gathered from FGD participants and KIIs (discussed in detail under Section 5.1) supports the idea that the importance attributed to community participation is a recent phenomenon. Thus, variation in PSNP duration within a community appears to be a driver of participation. A second aspect that stands out is that across all four participation aspects, greater awareness of the CBPWD is associated with greater participation. In terms of the magnitude, an increase in the proportion of members who are aware of the CBPWD, say by 10%, increases the likelihood of participation in the four project decisions by about 2%. Overall, the exploratory analysis supports the idea that it is within community variation in duration of PSNP membership and awareness of the CBPWD that translates into increased participation.[18]

6. Discussion and concluding remarks

This study was motivated by the limited evidence on the quality of rural infrastructure built through PWs based on social safety nets. While such programmes have been rolled out in a number of countries, the contribution of such programmes to the creation of rural infrastructure that is expected to serve as basis for rural development and food security has not attracted much systematic scrutiny. Indeed, maintaining the quality and durability of such rural infrastructure is a costly problem for developing countries.

18 Marginal effects based on ordered probit estimates of participation in different stages of the project cycle using household level responses and controlling for other factors, including watershed fixed effects, yield the same message that there is substantial variation in participation within watersheds (see Table A3 for an example of the marginal effects of an ordered probit estimation of participation in the four decisions falling under planning).

Table 11: Determinants of Community Participation in Project Decisions: Project Level OLS Estimates

	Project planning	Project use rule and benefit distribution	Project maintenance	Project monitoring and evaluation
Respondent's characteristics				
Female (share)	−0.018	−0.007	0.015	−0.05
	(0.068)	(0.061)	(0.066)	(0.069)
Average age	−0.059	0.209	0.088	0.095
	(0.257)	(0.220)	(0.249)	(0.274)
Religion: non-Muslim (share)	−0.027	−0.128	−0.172	0.019
	(0.123)	(0.090)	(0.109)	(0.105)
Primary education (share)	0.052	0.006	−0.081	−0.073
	(0.073)	(0.065)	(0.070)	(0.083)
Secondary and above education (share)	0.388	0.475∗	0.283	0.41
	(0.269)	(0.266)	(0.297)	(0.306)
Average household size	−0.971	−1.209	0.026	−0.901
	(1.561)	(1.357)	(1.580)	(1.491)
Female headed household (share)	−0.029	−0.077	−0.094	−0.08
	(0.095)	(0.089)	(0.094)	(0.107)
Average duration of membership	−2.773**	−1.876*	−2.637**	−1.52
	(1.108)	(0.988)	(1.058)	(0.987)
Perception of PSNP and CBPWD				
PSNP addresses food insecurity (share)	−0.168	−0.109	−0.036	−0.057
	(0.124)	(0.106)	(0.133)	(0.126)
PSNP well targeted (share)	0.061	0.071	0.024	−0.019
	(0.063)	(0.056)	(0.071)	(0.058)
Aware of CBPWD (share)	0.171***	0.163***	0.166**	0.145**
	(0.059)	(0.057)	(0.073)	(0.072)
Social interactions				
Trust PSNP members (share)	0.05	−0.053	−0.09	0.004
	(0.060)	(0.066)	(0.077)	(0.067)
Conflict between watershed streams (share)	0.026	−0.085	−0.076	−0.082
	(0.221)	(0.118)	(0.135)	(0.196)
Conflict within watershed stream (share)	−0.317	−0.181	−0.228	−0.266
	(0.222)	(0.122)	(0.156)	(0.225)
N	244	244	244	244
Adjusted R-sq	0.576	0.753	0.694	0.618

Notes: The specification additionally controls for watershed fixed effects. Robust standard errors in parentheses; ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

This study, which was based on Ethiopia's PSNP, examined the effect of the programme's community-based approach in determining the quality of rural assets. The study was based on a sample of 249 SWC projects located in 53 watershed communities in 4 food insecure districts in Oromia region and dealt with 3 aspects. First, the paper analysed the degree of community participation in project decision making. Second, the paper used SWC engineers to provide a technical assessment of the projects in terms of their project damage and whether they were fully operational. Third, the paper examined the role of community participation in influencing project outcomes.

We found a high degree of participation ranging from 72% to 83% across 12 participation decisions. Despite the overall high rate of participation, there were substantial variations in participation rates across the four districts. Paralleling the variation in participation, project damage was about 50% in districts with relatively low levels of participation and about half that in areas with almost complete participation. We were able to exploit the availability of multiple projects located in the same watershed community to identify the effect of variations in community participation on variations in project outcomes within the same community. This yields a more credible estimate of the effect of participation on outcomes as compared to approaches, which rely on variations across communities to identify the effect of participation. We found that community participation in project monitoring and evaluation played a substantial role in enhancing the physical and operational state of projects. The estimates indicated that increasing community involvement in areas that have relatively low participation rates (57%) to the rate observed in areas with high participation (95%) maybe expected to reduce project damage by 50%. This is a large effect and shows that good design features, in this case, participation plays a strong role in ensuring the durability of PSNP-built infrastructure.

This paper has relied on the use of variations within a watershed to achieve identification. The exploratory analysis of the drivers of participation shows that it is within watershed community variation in the duration of participation in PSNP and greater awareness of the community watershed approach that is associated with participation. However, it is still possible that it is the flow of project benefits that enhances participation and not only that participation leads to better project outcomes. Nevertheless, the results in this paper support the argument that greater community participation in project decisions is associated with more durable rural infrastructure and that at least in the Ethiopian case this particular design feature of the PSNP is worth implementing.

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Supplementary material

Supplementary material is available at *Journal of African Economies* online.

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Appendix

Table A1: Distribution of SWC Structures Surveyed per District (Planned Versus Actual)

District	Number of SWC structures				Actual/planned (%)
	Planned		Actual		
	Number of villages	Total per district	Number of villages	Total per district	
Yabello	5	75	4	54	72
Kuyu	4	60	4	45	75
Arsi Negelle	2	40	3	46	115
Doba	6	120	6	104	87
Total	17	295	17	249	84

Table A2: Pairwise Correlation Between Different Decision Categories

Variables	Project planning	Project use rule and benefit distribution	Project maintenance	Project monitoring and evaluation
Project planning	1.00			
Project use rule and benefit distribution	0.857***	1.00		
Project maintenance	0.813***	0.935***	1.00	
Project monitoring and evaluation	0.834***	0.802***	0.775***	1.00

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

Table A3: Determinants of Community Participation in Planning Decisions: Marginal Effects After Ordered Probit

	No participation	One decision	Two decisions	Three decisions	Four decisions
Respondent's characteristics					
Female	0.0011	0.0016	0.0039	0.0072	−0.0137
	(0.0008)	(0.0011)	(0.0027)	(0.0049)	(0.0094)
Age	0.00002	0.00003	0.0001	0.0002	−0.0003
	(0.00002)	(0.00003)	(0.0001)	(0.0002)	(0.0003)
Religion: non-Muslim	−0.0002	−0.0003	−0.0006	−0.0012	0.0022
	(0.0009)	(0.0014)	(0.0035)	(0.0064)	(0.0122)
Primary education	−0.0014***	−0.0022***	−0.0057***	−0.0109***	0.0203***
	(0.0005)	(0.0008)	(0.0019)	(0.0038)	(0.0067)
Secondary and above education	−0.0016***	−0.0026***	−0.0072***	−0.0149***	0.0263***
	(0.0004)	(0.0007)	(0.0018)	(0.0043)	(0.0067)
Household size	−0.00003	−0.00004	−0.0001	−0.0002	0.0004
	(0.0001)	(0.0002)	(0.0005)	(0.0010)	(0.0018)
Female headed household	0.0001	0.0001	0.0003	0.0006	−0.0012
	(0.0008)	(0.0011)	(0.0028)	(0.0052)	(0.0099)
Duration of membership	0.0003**	0.0005**	0.0012**	0.0021**	−0.0041**
	(0.0001)	(0.0002)	(0.0005)	(0.0009)	(0.0017)
Perception of PSNP and CBPWD					
PSNP addresses food insecurity	0.0007	0.0011	0.0027	0.0053	−0.0098
	(0.0006)	(0.0009)	(0.0023)	(0.0045)	(0.0082)
PSNP well targeted	−0.0011	−0.0016	−0.0039	−0.007	0.0136
	(0.0011)	(0.0016)	(0.0036)	(0.0064)	(0.0126)
Aware of CBPWD	−0.0034***	−0.0052***	−0.0132***	−0.0256***	0.0473***
	(0.0008)	(0.0010)	(0.0020)	(0.0039)	(0.0056)
Social Interactions					
Trust PSNP members	−0.0011**	−0.0017**	−0.0044**	−0.0084**	0.0155**
	(0.0005)	(0.0008)	(0.0021)	(0.0042)	(0.0074)
Conflict between watershed streams	−0.0001	−0.0001	−0.0002	−0.0004	0.0008
	(0.0023)	(0.0035)	(0.0088)	(0.0164)	(0.0310)
Conflict within watershed stream	0.0016	0.0022	0.0052	0.0092	−0.0182
	(0.0017)	(0.0022)	(0.0050)	(0.0086)	(0.0174)
N	1,202	1,202	1,202	1,202	1,202
Pseudo R-sq	0.313	0.313	0.313	0.313	0.313

Notes: The specification additionally controls for watershed fixed effects. Robust standard errors in parentheses; ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.