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## Analysis

## A Policy Evaluation of the Direct Payment Scheme for Collective Stewardship of Common Property Resources in Japan



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## ABSTRACT

The extent to which Payments for Environmental/Ecosystem Services (PES) programs help to promote collective stewardship of common property resources (CPRs) has been gaining attention among scholars and practitioners. One of the main concerns related to collective arrangements is that a crowding-out effect is likely to emerge when the external intervention dominates over self-determination and self-esteem of PES participants. By contrast, when participants perceive the intervention to be supportive of existing efforts, it “crowds in” intrinsic motivation. We test this contested hypothesis using prefectural data from Japan's Census of Agriculture and Forestry. In order to set up a viable quasi-experimental policy evaluation, we employ a propensity score matching approach. Our empirical result suggests that financial incentives can have a positive causal effect on collective stewardship of CPRs. This means that the potential crowding-out effect, if any, is not so profound as to expunge additional extrinsic motivation provided by the government's direct payments. Another important finding is that pre-existing social cohesiveness at the community level serves as a facilitator for PES participation. It should be noted, however, that the degree of cohesiveness in rural communities is largely a byproduct of historical experience that lies outside the immediate control of the government.

## 1. Introduction

Contrary to Hardin's (1968) pessimistic prediction on the management of common property resources (CPRs), customary rules and agreed norms in rural communities can effectively create a cooperative environment that modulates resource access and pre-empts the incentive to free ride, leaving CPRs well-preserved and utilized. Unsurprisingly, the individual context and institutional structures are critical aspects of determining local management outcomes. But in general, self-governing communities, which are defined by collective action, are more likely to adopt protective and curative measures in CPR management (Ostrom, 2000). Understanding the specific dynamics of community cooperation is of particular relevance for countries and regions in which crops are grown under conditions of autonomous local control of the water supply and with a production base characterized by small, dispersed landholdings. These conditions, which are common in many regions of Asia and Africa, as well as in rugged topographical regions worldwide, are particularly in need of communal approaches to CPR management. Surprisingly, however, most existing programs to support such approaches around the world, often under the framework of Payments for Ecosystem Services (PES), are designed on the premise that farmers, fishermen, and foresters participate in the various

schemes on an individual basis (Wunder et al., 2008).

Reflecting the fact that most PES programs have been institutionalized on an individual basis, there is a significant body of literature that focuses on individual farmers' decisions to participate in agricultural PES programs (e.g., Grillos, 2017; Hegde et al., 2014; Murphy et al., 2014; Yeboah et al., 2015; Zbinden and Lee, 2005, and so on). Simultaneously, there is also growing criticism against individual-based PES programs, as they can lead to “individual, disconnected actions” or “social fragmentation” in CPR management, whereas optimal environmental results are often obtained when there is coordination of activity (Cooke and Moon, 2015; Mettepenningen et al., 2013). Murtinho and Hayes (2017) also document that PES programs are increasingly being applied in communal settings where resource users collectively join a program and agree to limit their combined use of CPRs. This has been substantiated variously by Cranford and Mourato (2011), Hayes et al. (2015), and Kerr et al. (2012, 2014). Nevertheless, few attempts have been made, relying on community-level aggregate data, to fill the knowledge gap that exists in the evaluation of collective participation in PES.

In Japan, it is widely understood that continuous cultivation of farmland and communal stewardship of agricultural CPRs not only enhances the preservation of the natural environment by providing

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favorable habitats for various terrestrial and aquatic life forms, but also helps maintain the functionality and aesthetic appeal of the rural landscape that is prized by locals and tourists alike. While rice growing, in particular, is accompanied by negative environmental impacts of agricultural runoff, there is a general appreciation in Japan for the varied functional capability of well-managed paddy field farms, including storing rain and ground water, enhancing biodiversity, protecting the natural environment, as well as providing scenic landscapes in the countryside, all of which are increasingly important to encroaching urban communities (MAFF, 2015). Because these external benefits are realized “offsite”, resource users would not necessarily be rewarded for the services they provide (Hegde and Bull, 2011). This lack of direct compensation has historically been offset by the high direct use values of CPRs, as well as a culture of obligation and solidarity among rural communities, but the past decades have witnessed some destabilization due to the relative contraction in agriculture, depopulation in rural areas, and progressive aging of farm workers (Shimada, 2015). In seeking a way to remedy the widening divergence between social and private benefits – a perennial problem of common property management worldwide – and as part of a broader set of modern rural support interventions, the Japanese government has turned to policies that incentivize CPR stewardship.

Against this background, the Japanese government introduced the Farmland, Water and Environmental Conservation Improvement Scheme (CIS) in 2007, a program that entails financial transfer to CPR custodians with the aim of promoting collective action for CPR conservation. The CIS broadly can be considered a voluntary scheme but, like other similar policies being promulgated worldwide, it demands strict conditionality in order to realize efficient and sustainable exploitation of CPRs. Added to this, and evidenced by the fact that the name was changed in 2014 to “Payments for the Enhancement of Agricultural Multi-functionality”, it is clear that securing broader environmental benefits for the public constitutes an important complementary policy goal of the CIS beyond the promotion of basic conservation activities. In this sense, the CIS is broadly aligned with PES programs that have been increasingly adopted recently, both in developed and developing countries.<sup>1</sup> A potential striking point in applying the PES approach to Japan is that the small and dispersed landholdings typical of Japanese agriculture make individual contracts ineffective and administratively burdensome. For this reason, the CIS payments have been offered to eligible activity groups, mostly rural communities, in lieu of individual farmers, on the condition that the group members act cooperatively in the maintenance of CPRs. The adoption of this group payment system reduces transaction costs by aggregating recruitment (Narloch et al., 2017). In this, we can contribute to the relevant literature by reflecting on the CIS as a case study in designing cooperative PES programs and efficiently employing scarce public resources.

To participate in the scheme, the candidate groups have to sign a contract with the government outlining the conditions and the scope of collective action for maintaining CPRs. In case participants fail to comply with the contract, they have to return the funds they received

<sup>1</sup> Wunder (2015) defines PES as voluntary transactions between service users and service providers that are conditional upon agreed rules of natural resource management for generating offsite services. Government-financed programs, such as the CIS, are only voluntary on the provider side of environmental services. Thus, it is considered that user or beneficiary-financed PES programs, which are based on two-sided voluntary transaction, are more likely to have broader coverage and be efficient than purely government-financed ones (Wunder et al., 2008). However, Vatn (2010) claims that while in theory PES is seen as a market solution to environmental problems, many case studies show that PES depend fundamentally on state and/or community engagement. Muradian and Rival (2012) also show that market oriented tools have gained considerable attention, but they are still far from being dominant policy strategies for environmental protection. Instead, more generally it is important to analyze the mechanisms of the incentive provision and income compensation for environmental service providers, regardless of the form of the PES program.

retrospectively. Accordingly, potential participants decide whether to participate in the scheme after taking account of their institutional capacity to fulfill the contractual obligations and manage the economic consequences brought about by implementation of the scheme. This imposition of mutual inter-dependency means that social and contextual characteristics of each community strongly influence the choice to participate. In this paper, we address three related characteristics in our hypothesis, namely that intra-community cohesiveness, demographic and geographical conditions, and factor endowments in a community combine to determine the probability of collective participation in the CIS.

To meaningfully add to the PES debate using this case study, the major objectives of this paper are twofold: first, to identify key factors that influence collective participation in the CIS; second, to measure the extent to which certain target CPRs are preserved as a result of the implementation of the CIS. Ascertaining “additionality”, an expression which captures the marginal contribution of PES to overall performance, is a major concern in previous studies because it is an essential element in justifying the program to the public. Specifically, many empirical studies addressing PES effectiveness use econometric techniques to corroborate a causal effect of scheme implementation on improved CPR maintenance (e.g., Alix-Garcia et al., 2012; Arriagada et al., 2012; Hegde and Bull, 2011; Mezzatesta et al., 2013; Sills and Caviglia-Harris, 2015, and others). On this issue, we address two related empirical challenges. The first is whether group payments conditional on collective stewardship of CPRs, which characterize the functioning of the CIS and other the Japanese PES programs,<sup>2</sup> deliver the expected results demanded in the subsidy guidelines, namely improved maintenance regimes and more consistent care of CPRs. As noted by Engel (2016) and Narloch et al. (2017), making payments conditional upon group performance – practice-based conditionality in the PES literature (Wegner, 2016) – has the advantage of establishing mutual-liability mechanisms with strong incentives for contract compliance, which helps enhance the CIS’s “additionality”. On the other hand, group payments may perversely incentivize individual resource users to free ride on the efforts of other group members, a common problem when communities are heterogeneous in terms of members’ dependence on CPRs (Kaczan et al., 2017). The second challenge to address in the context of “additionality” is whether external intervention crowds out participants’ intrinsic motivation to conserve CPRs, based on social norms and reciprocity (Ostrom, 2005; Van Hecken and Bastiaensen, 2010). If the crowding-out effect on pro-social behavior were to be so significant as to cancel out the direct impact of the CIS, as some research has suggested (Deci et al., 1999), taxpayers or funders would balk at such a scheme. Needless to say, the effect of motivation crowding on collective action is likely to depend on whether PES payments are made on an individual or group basis (Kerr et al., 2012). We hypothesize in this paper that as long as the CIS is supportive primarily of participant groups, the potential crowding-out effect, if any, is not so powerful as to expunge additional extrinsic motivation provided by the government’s direct payments (Vollan, 2008).

We explore these two research questions – participation in the CIS and the program’s output – using data from Shiga, a prefecture in Japan known for its progressive approaches to natural resource management. For the empirical method, we take a step-wise approach; first, we identify key factors that affect collective participation in the CIS by estimating a propensity score function (probit model), and second, we measure the effectiveness of the CIS using the propensity score matching (PSM) method (Rosenbaum and Rubin, 1983). Given that participation in the CIS is not randomly assigned but rather based on the community’s decision, a simple difference in the outcome related to

<sup>2</sup> The Direct Payment Scheme for Hilly and Mountainous Areas (DPS), which is another PES program introduced in 2000 to support geographically disadvantaged farms in Japan, is also characterized by group payments conditional upon community-level collective action.

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