

Collective Action Dynamics under External Rewards: Experimental Insights from Andean Farming Communities

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Summary. — This paper explores the potential effects of external reward systems on conservation behavior by accounting for their interactions with patterns of collective action. In order to simulate such dynamics, we conducted framed field experiments in farming communities from the Bolivian and Peruvian Andes. These game-based simulation exercises were framed around agrobiodiversity conservation decisions the participating farmers were very familiar with. We find that collective rewards could be ineffective and crowd-out social norms. Promisingly though, individual rewards appear to increase conservation levels through a crowding-in effect that stabilizes collective action.

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1. INTRODUCTION

External reward mechanisms, such as Payments for Ecosystem Services (PES), may provide resource users with an incentive to conserve that which benefits wider society, and thus have been praised as a more flexible and effective instrument to facilitate protection of public ecosystem services as compared to those based on regulation (Ferraro & Kiss, 2002; Kinzig *et al.*, 2011; Landell-Mills & Porras, 2002; Wunder, 2006). Yet it has widely been neglected that formal institutions, like PES, are embedded in social systems and thus interact with informal institutions such as social norms within a community (Muradian, Corbera, Pascual, Kosoy, & May, 2010).

Globally, it has been found that resource users have created self-governing mechanisms for the sustainable management of their ecosystems (Cardenas & Carpenter, 2008; Henrich *et al.*, 2001; Ostrom, 1990). In many rural communities collective action¹ toward conservation is based on social norms (Rustagi, Engel, & Kosfeld, 2010). In such contexts, it has been found that can PES as an economic instrument may provide little additional incentive for conservation but could instead affect deontological or moral incentives for conservation (Sommerville, Milner-Gulland, Rahajaharison, & Jones, 2010). Similarly, Reason and Tisdell point out that "... under some circumstances, introducing market-based institutions to provide incentives for the provision of public goods may have unintended consequences" (2010, 452). In line with these concerns, it has also been argued that interventions introducing formal institutions may crowd-out existing pro-social norms (Cardenas, Stranlund, & Willis, 2000; Reeson & Tisdell, 2008, 2010; Vollan, 2008). Similarly, there is anecdotal evidence that can PES replace intrinsic motivations for

environmental protection and thus hamper existing conservation efforts (Clements *et al.*, 2010; Pattanayak, Wunder, & Ferraro, 2010; van Hecken & Bastiaensen, 2010).

Nonetheless, different reward systems, such as individual rewards, whereby resource users are paid for their private conservation efforts and collective rewards in the form payments for a group's aggregated conservation levels, may affect existing social norms differently and they may erode (i.e., crowd-out) such norms or complement (i.e., crowd-in) them as found in experimental studies by Travers, Clements, Keane, and Milner-Gulland (2011). The responses to such formal institutions, however, can be expected to be context specific, as they are shaped by existing social norms (Cardenas & Carpenter, 2008; Velez, Murphy, & Stranlund, 2010; Vollan, 2008), as the social preferences underlying such norms evolve given daily social and economic interactions (Bowles, 1998; Ostrom, 2000; Carpenter & Seki, 2010).

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Empirical evidence thus far indicates that “interventions sometimes do more harm than good, are sometimes completely ineffective, and at other times complement existing community efforts” (Velez *et al.*, 2010, 264). Therefore, it is important to account for the social preferences relevant to the implementation of policy interventions (Bowles, 2008; Reeson & Tisdell, 2008, 2010). These ought to be studied in different market and group contexts, in order to provide guidance on how to design such reward mechanisms, so that they build upon rather than undermine existing informal institutions so as to strengthen collective action.

The application of framed field experiments can shed light on collective action dynamics when resource users face different pay-off situations subject to their group contexts (Cardenas & Ostrom, 2004). In order to simulate potential interactions between formal and informal institutions we conducted field experiments in farming communities from the Andean Altiplano (high plains). This game-based simulation exercise was framed around decisions these farmers are used to take in daily life; that is choosing between different crop varieties to grow on their lands subject to existing patterns of collective action. This design links to a rich literature on Andean farming behavior related to collective action in agrobiodiversity management (e.g., Brush, 1992; Zimmerer, 1991, 2002).

An impure public goods game was designed so as to reflect a situation where the conservation and utilization of traditional crop varieties, while often bringing lower private market returns as opposed to commercial varieties, also generates public good benefits for the local community. The latter include such benefits as pest and disease regulation, nutrient transfer, gene flow, as well as the maintenance of socio-cultural traditions and seed systems (as per Coomes, 2010; Heisey, Smale, Byrlee, & Souza, 1997; Zimmerer, 1998, 2010). Furthermore, the impure public good game incorporates different endowment statuses and the introduction of individual or collective reward treatments. Two study sites were selected, one in Bolivia with more commercial-oriented farming systems, and one in Peru where production is more subsistence-oriented. By doing so, this paper seeks to simulate collective action dynamics under external rewards controlling for varying contextual factors.²

The paper directly adds to recent work studying the interactions of social systems and agrobiodiversity conservation in farming communities such as those of the Andes (e.g., Lewis, Barham, & Zimmerer, 2008; Zimmerer, 2010) and the Amazon (Coomes, 2010; Stromberg, Pascual, & Bellon, 2010) and field experiments on the role of PES-like payments on cooperation (Kerr, Vardhan, & Jindal, 2012; Travers *et al.*, 2011; Vollan, 2008). The paper does not only bridge these two strands of literature, but also goes further providing more explicit insights into the collective action dynamics that can take place when PES-like rewards are introduced in traditional farming communities.

The next section provides a brief overview of recent experimental studies on the interaction between formal and informal institutions, and possible crowding-out and crowding-in effects. In Section 3 the field context in which the framed experiments are conducted is described, before detailing the design and setting of the game in Section 4. Section 5 presents the empirical results on the effectiveness of the different reward systems at a group-level before analyzing the determinants of individual-level conservation behavior, with particular attention being paid to the interaction of the reward systems with social preferences. As the econometric pooled estimates assume the same structure of social preferences for each individual, this section seeks to further refine the analyses by

looking in more detail into the effect of rewards on different behavioral types. Section 6, then, concludes with the main findings and policy implications.

2. CROWDING-OUT OR CROWDING-IN?

Although standard economic theory would predict that individuals mostly follow their self-interests and free-ride on others, there is ample evidence from field observations (e.g., Ostrom, 1990) and from framed field experiments in many different settings that resource users follow pro-social norms to overcome social dilemmas related to the overexploitation of common pool resources (Cardenas, 2000, 2004; Cardenas, Stranlund, & Willis, 2002; Castillo, Bousquet, Janssen, Worrapimphong, & Cardenas, 2011; Reichhuber, Camacho, & Requate, 2009; Velez, Stranlund, & Murphy, 2009) and the provision of public goods (Cardenas, Rodriguez, & Johnson, 2011; Carpenter, Daniere, & Takahashi, 2004; Carpenter & Seki, 2010; Henrich *et al.*, 2005).

(a) *Social norms and collective action*

Individuals are normally driven by a combination of self-interest and social preferences, such as conditional as well as unconditional cooperativeness, inequity aversion and risk aversion, which in turn reflect social norms such as altruism, reciprocity, fairness, and safety-first (Cardenas & Carpenter, 2008; Velez *et al.*, 2009). As social preferences are endogenously shaped (Carpenter & Seki, 2010; Castillo & SAYSSEL, 2005; Henrich, 2000), collective action depends on socio-economic and cultural backgrounds (Cardenas & Ostrom, 2004; Cardenas *et al.*, 2011; Henrich *et al.*, 2010; Prediger, Vollan, & Frolich, 2011).

For instance, market-orientation has been found to explain a substantial part of the variation in collective action. On the one hand, markets foster the interactions of individuals and thus enhance social learning, as well as the evolution of social norms (Bowles, 1998), so that it has been found that in some market-integrated societies cooperative behavior prevails (Ensminger, 2004; Henrich *et al.*, 2001, 2010). On the other hand, strong market incentives may result in competitive environments undermining collective action (Carpenter & Seki, 2006; Prediger *et al.*, 2011).

Furthermore, social preferences depend on the resource users' position within a group. For instance, perceptions of local fairness based on inequalities in burden-sharing and/or benefit distribution, are likely to affect how individuals behave in overcoming social dilemmas (Cardenas, 2003; Cardenas *et al.*, 2002; Janssen, Anderies, & Cardenas, 2011). The relative opportunity costs of allocating scarce resources (e.g., land) to conservation are often significant for resource users with limited endowments, when these need to be used for private purposes (e.g., food production) so as to ensure survival (Baland & Platteau, 1999). By contrast, wealthier resource users' opportunity costs associated with contributing to group projects are generally lower. In addition to that, where public benefits only materialize above certain thresholds, they are in a better position to ensure the attainment of these thresholds (Baland & Platteau, 1999). However, while wealthier resource users may conserve more in absolute terms, it could be that poorer households bear most of the burden in providing group benefits by contributing a higher share of their scarce resources. Such outcomes may trigger even more inequality, thereby further reducing conservation levels (Janssen *et al.*, 2011).

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