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# Inequality, social sanctions and cooperation within South African fishing communities

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## ABSTRACT

We explore the effect of income inequality and social attitudes on cooperation and sanctioning in nine South African fishing communities, where allocation of fishing rights via quota and permits have been unequal and controversial. We use a linear public goods experiment design with heterogeneous endowments and peer sanctioning. In the Punishment treatment, aggregate contributions towards the public good are significantly higher amongst unequal groups, with low endowment players contributing the greatest endowment share. Sanctioning is significantly lower in unequal groups but demand for punishment is similar, irrespective of differences in relative costs. Free-riding drives punishment, but retaliation is another important motivator (specifically in unequal groups). In equal groups, antisocial punishment of cooperators is more common. The effect of real wealth and inequality on contributions and punishment is less salient, possibly due to real wealth not being discernible in the experimental context. Interestingly, social attitudes are important in explaining sanctioning behavior, indicating that distrust in formal institutions, and specifically in the top-down quota allocation process, may have a significant impact on behavioral outcomes and the effectiveness of community sanctioning mechanisms.

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## 1. Introduction

In this paper we present the results of linear public goods experiments, conducted with individuals from nine fishing communities in South Africa. Fishing rights in these communities have been restricted and unequally distributed via the allocation of quotas and permits. We introduce experimental treatments with inequality in endowments as well as peer punishment, in order to study the impact that inequality has on the ability of groups to sustain and enforce cooperation through social sanctioning. We are interested in how individuals from such communities cooperate in an experimental context and whether experimentally induced inequality can help us to understand the dynamics of inequality in a real world setting. To this end, we also examine the effect of a host of socio-economic variables, including measures of real wealth and inequality, as well as attitudes towards the fishing rights allocation process and illegal harvesting on cooperative and sanctioning behavior.

Our sample specifically draws from individuals with extensive experience of social dilemmas and sanctioning, since their livelihoods depend directly or indirectly on fishing. Moreover, irregular allocation of fishing quota by government has

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resulted in externally imposed income inequality (with allocations often perceived as benefitting a small elite instead of previously disadvantaged individuals), leaving subsistence and small-scale commercial fishing communities divided (O’Roirdan, 1999; Isaacs, 2006; Sowman, 2006).<sup>2</sup> Allocation of quota is generally perceived as unfair and arbitrary by the community members: complicated application procedures and exorbitant application fees restrict entry, and there is an overall lack of transparency (Isaacs et al., 2005; Hauck and Kroese, 2006). Corruption amongst officials is another factor that undermines compliance efforts (Hauck and Kroese, 2006), rendering poaching a common and lucrative activity pursued by both quota holders and those who did not receive a fishing quota.<sup>3</sup> We therefore include both of these groups, as well as members of the community with indirect exposure to fishing activities in the experiments.

In the absence of well functioning formal institutions associated with effective centralized regulation, the role of social institutions at a local level is essential in securing the provision of public goods and in resolving social dilemmas related to natural resource extraction (Allesina and La Ferrara, 2000; Romer, 1986; Lucas, 1996). Poverty, lack of employment opportunities and competition for scarce resources put additional pressure on individuals to act in the interest of their own households to secure basic needs often in conflict with mutual needs of others in the community. Moreover, the majority of developing countries are characterized by large inequalities in income, education and opportunities to accumulate private wealth.

It has been reported that extremely unequal societies may be limited in their capacity to interact as communities due to a breakdown in cooperation (Allesina and La Ferrara, 2000; Bowles and Gintis, 2002). A number of empirical studies (Gaspard et al., 1998; Baland and Plateau, 1999; La Ferrara, 2002) have indicated that the overall effect of inequality on the provision of public goods can be ambiguous, but that incentives to participate are greater for those who are able to appropriate greater net benefits from the public good (Rapoport, 1988; Allesina and Angeletos, 2005).

Experimental studies on inequality and the provision of public goods conducted with students in labs have also yielded ambiguous results, with some studies finding negative impacts of inequality on cooperation (Fisher et al., 1995; Cherry et al., 2004; Anderson et al., 2008), while others have found inequality to have a positive effect on aggregate contributions (Buckley and Croson, 2006; Chan et al., 1993, 1997, 1999). Studies of behavior within unequal groups report high endowment players to contribute more in *absolute* terms to a public good, when group members are allowed to contribute a *part* of their endowment (Van Dijk and De Cremer, 2006)<sup>4</sup>, but that low endowment players contribute a higher *share* (relative to their endowment) towards provision of the public good than high endowment players in repeated (Chan et al., 1997, 1999; Buckley and Croson, 2006) and one-shot (Cherry et al., 2004) public goods games, where no threshold is required.

Insightful studies on the effect of peer sanctioning on cooperation have also been conducted (see for example Fehr and Gächter, 2000; Masclat et al., 2003; Nikiforakis, 2008 and Cinyabuguma et al., 2005, 2006). The role of internal sanctions aimed at mitigating free-riding behavior is important in developing countries, given demanding administration and costs associated with external monitoring and enforcement. Studies by Tyrann and Feld (2006) and Noussair and Tucker (2005) suggest that internal sanctions may be more efficient than externally enforced sanctions. Evidence from the field (see Van Soest and Vyrastekova, 2004),<sup>5</sup> as well as experimental studies on the provision of public goods (Fehr and Gächter, 2000; Bochet et al., 2006; Falk et al., 2005; Sefton et al., 2001; Carpenter et al., 2004a,b), have indicated that individuals use peer sanctioning to express disapproval and successfully coerce free-riders into contributing, even if such actions are costly to undertake.

However, very little research has been done on (a) the role of social sanctioning on contributions in the presence of inequality or (b) the level of sanctioning provided under such conditions.

As far as the level of sanctioning is concerned, Masclat and Villeval (2008) study the effect of inequality that arises endogenously during play on sanctioning. They observe that players will attempt to adjust pay-off differences by allocation of punishment, and that over repeated interaction, inequality is reduced in the presence of punishment, since it curbs free-riding. Tan (2008) considers the effect of productivity differentials (by varying the MPCr in a public goods game) on sanctioning and subsequent welfare. She finds that, conditioned on individual contributions, high productivity individuals receive more punishment. While allowing for punishment using this design increases cooperation, it does not increase welfare. Reuben and Riedl (2009) also vary the marginal benefit received from the public good by different players in a group, to study the extent to which privileged groups are able to use sanctioning mechanisms to increase contributions. Their findings indicate that privileged groups are less efficient at using sanctions to punish free-riders and also to raise overall contributions.

The only studies besides ours, that we are aware of, that introduce differences in endowments (initial wealth) when studying the effect of inequality on sanctioning behavior in the presence of peer monitoring is that of De Cremer and Van Dijk (2009) and Reuben and Riedl (2013). Focussing on the provision towards sanctioning (as a second order dilemma), De

<sup>2</sup> Appendix A provides a summary of our sample, indicating that average income for those with fishing rights are markedly higher than for those without such rights.

<sup>3</sup> In a related paper, Brick et al. (2012) find that those with access to fishing rights are more likely to poach, given that they have a legal motivation for being out at sea.

<sup>4</sup> Cardenas (2003) in turn conducted non-linear CPR experiments with heterogeneous groups and found wealthier individuals to extract less from the CPR than poorer individuals in absolute terms.

<sup>5</sup> The authors cite examples of fishermen in the Bahia region in Brazil who destroyed the nets of fellow fishermen that did not adhere to quotas.

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