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Potential Pareto Public Goods☆

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ABSTRACT

Potential Pareto Public Goods create an aggregate benefit to society while harming some members of the community. As the overall benefit outweighs the harm incurred, provision may lead to Pareto improvement if the gains from cooperation are used to compensate the harmed parties. Such situations are ubiquitous, e.g., in not-in-my-backyard (NIMBY) problems. We study experimentally voluntary contributions to Potential Pareto Public Goods, in which provision is efficient but harms a minority in the group. We test the effects of punishment and reward institutions, with and without communication. We find that contributions to Potential Pareto Public Goods are not viewed as unequivocally socially desirable and do not increase with communication or punishment. With the reward institution, communication facilitates compensation, undoing the harm imposed on the minority player by majority contributions. Consequently, contributions are no longer viewed as socially undesirable, and majority contributions increase. Taken together, our results establish that perceptions and behavior in voluntary contributions to Potential Pareto Public Goods are dramatically different than with universal public goods that benefit all members of the community. We suggest that the underlying mechanism is team reasoning: individuals consider what is good for the group, and play their part in achieving that goal.

1. Introduction

Some public goods are *universal*, in the sense that they benefit all members of the community. Still, many others are only *Potential Pareto Public Goods* :[1] they create an aggregate benefit to society but harm some members of the community. Nonetheless, the overall benefit outweighs the harm incurred, so that provision may lead to Pareto improvement if the gains from cooperation are used to compensate the harmed parties.

Potential Pareto Public Goods are ubiquitous. One widespread category is Not-in-my-back-yard (NIMBY) situations (Schively, 2007). For example, people who live in proximity to highways, trains, and airports—a classic public good—incur negative externalities despite the overall social-welfare enhancing effect of transportation infrastructure. Theoretically, such cases can be resolved using compensation (Kunreuther et al., 1987; O'Hare, 1977). However, the conditions under which compensation schemes are effective in overcoming the NIMBY problem are not yet fully understood (Frey and Oberholzer-Gee, 1996; Frey et al., 1996).

More generally, any land development and (re)zoning requires communities to cooperate. For example, in petitioning zoning committees to advance a socially beneficial development (Babcock and Siemon, 1985; Fischel, 2015, 1985; Nelson, 1977). Such cooperation is hindered by potential harms imposed on some members of the community in two ways. First, by making members of the community reluctant to advance development and rezoning that harms their peers. Second, when the harmed parties directly use existing institutions to obstruct development. In the case of the New Hampshire pulp mill studied by Fischel (1979), for example, stringent opponents of the mill forced open meetings with the mill representative, thereby effectively precluding compromises that may be beneficial for the majority of the community (Fischel, 1985).

Other examples of Potential Pareto Public Goods include large scale irrigation systems. Duflo and Pande (2007) have shown that construction of large irrigation dams in India benefits those districts that are located downstream from the dam, but harm the district where the dam is located. Duflo and Pande (2007) interpret this

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result as evidence for a failure to generate Pareto improvement by sharing the benefits resulting from the dam construction. Similar situations arise with smaller irrigation systems that are created and maintained by voluntary communal effort. (e.g., Balasubramanian and Selvaraj, 2003; Lam, 1998). Irrigation systems designed for a specific use may interfere with water consumption for other uses. A system designed for agricultural use reduces the availability and water quality for household use, including cooking, cleaning and horticulture.[2] Fujiie et al. (2005) indeed found that a high share of nonfarm households in the community impedes collective action by Philippines farmers.

The spatial structure of farming communities also gives rise to conflicting interests. Headenders—those whose lands are located near the source of the water system—have more access to water, and are likely to resist cooperating with tailenders in irrigation systems that lead to more efficient and egalitarian water allocation (Tang, 1992). Successful cooperation in constructing and maintaining such systems, therefore, depends on finding "ways in which headenders can be better off and see themselves as better off with less water" (Chambers, 1988).

At the macroeconomic level, Potential Pareto Public Goods are closely related to issues of societal fractionalization and its effect on public goods provision. Alesina and Ferrara (2005) show in a simple model that higher diversity in preferences for different public goods lowers the level of public goods provision chosen by a central social planner (see also Alesina and Spolaore, 1997). Indeed, fractionalization is negatively correlated with centralized public goods provision (Alesina et al., 1999, 2003), collective action (Alesina and La Ferrara, 2000; Vigdor, 2004) and growth (Easterly and Levine, 1997). This problem is exacerbated if public goods preferred by a large part of society are actually harmful to a minority.

While the role of inequality in economic benefits in public goods provision has been thoroughly studied (Baland and Platteau, 1997; Bardhan and Dayton-Johnson, 2002; Olson, 1965; Poteete and Ostrom, 2004; Varughese and Ostrom, 2001), the issue of harmed minorities remains understudied. How do communities perceive public goods that are not universal? How do the harmed minorities interact with the broad community? Can communication and compensation facilitate Pareto-improving public goods provision?

In this paper, we experimentally study voluntary public goods provision in Potential Pareto Public Goods. While Güth et al. (2011, 2014) found that a centralized revelation mechanism can lead to efficient outcomes in a similar situation, it is not at all clear that the same applies for a decentralized voluntary provision mechanism. Similarly, Engel and Rockenbach (2011, 2014) found that contributions did not decrease when *non-active* players are harmed by the public good (compared to other situations involving non-active players).[3] Delaney and Jacobson (2014) also found that the addition of a passive harmed minority did not affect contributions, this time when the net social benefit from contributions is negative. Contributions did decrease, however, when the negative externalities were levied on active members of a separate group—such that each player is aware of potentially being in the role of the harmed outsiders for another group. In contrast to the existing studies, we argue that new considerations arise when there is a harmed minority that is an integral part of the active group, for several reasons that we discuss below.

A harmed minority pays a double cost when contributing. The direct cost of investment in the public good is augmented by the indirect harm imposed by the increased provision of the public good. Accordingly, the minority player has a justification for not contributing. Unlike the harmed third parties in Engel and Rockenbach (2011, 2014), who are not asked to make a contribution decision, the existence of an integral player who refrains from contributing may erode contribution norms and lead the majority players to reduce their contributions (de Oliveira et al., 2015). Whether majority players realize the predicament of the harmed minority and ignore the lack of contributions is an empirical question. This is tested in our first conjecture.

Conjecture 1. *Majority contributions respond positively to higher contributions by the minority player.*

We study the efficacy of punishment and reward institutions in Potential Pareto Public Goods. Such institutions have garnered substantial attention as ways to overcome the problem of collective action—as free riders are punished and contributors are rewarded (Fehr and Gächter, 2000, 2002; Fehr et al., 2010; Ostrom et al., 1992; Rand et al., 2009; Sefton et al., 2007; Sutter et al., 2010; Walker and Halloran, 2004). Punishment institutions are not effective, however, if contributors are punished as much as free riders (Herrmann et al., 2008). Such *anti-social punishment* was shown to exist as part of cultural norms (Gächter et al., 2008), or to emerge due to environmental uncertainty (Ambrus and Greiner, 2012; Bornstein and Weisel, 2010; Grechenig et al., 2010) or counter-punishment (Nikiforakis, 2008). In the context of Potential Pareto Public Goods, anti-social punishment can result if the punishment institution is (mis)used by the harmed minority member to deter others from contributing. Furthermore, pro-social punishment—that is, punishment of low contributors—may be hindered by the ambiguous contribution norms with respect to the harmed minority. As a minority player should be expected not to contribute, a majority player can free ride without being the lowest contributor. Typically, lower contributions are met with higher punishment. Thus, high contributors may be reluctant to punish a majority peer more than a minority player who contributed less. Previous studies have shown that heterogeneity may be enough to obscure whether and how contribution norms violations should be punished (Noussair and Tan, 2011; Tan, 2008). This problem may be exacerbated with harmed minorities. These considerations are reflected in our next conjecture.

Conjecture 2. *An environment with a harmed minority fosters anti-social punishment by the minority player and is unfavorable to pro-social punishment by the majority players. As a result, punishment institutions do not facilitate public goods provision.*

Finally, we turn our attention to reward institutions. Whereas punishment institutions are subject to misuse and mis-targeted punishment, reward and redistribution institutions can be used to compensate the harmed minorities as is often done centrally in cases of LULU's—Locally Unwanted Land Uses (Armour, 1991)—and NIMBY's. Redistribution effectively reinstates the possibility for mutual gain from cooperation, leading to Pareto improvement even in the presence of a harmed minority. This, however, requires a non-trivial agreement by which the minority contributes to generate surplus, part of which is transferred back by the majority players. Accordingly, we test whether communication between the players can foster such an agreement to boost contributions by the minority player.

Conjecture 3. *When rewards are feasible, majority players compensate the harmed minority. Communication facilitates compensation, and enables Pareto improvement through minority contributions.*

[2] Such disparate preferences often exist within the same household, where the man is responsible for agricultural activities and the woman for household uses (Meinzen-Dick and Bakker, 1999; Meinzen-Dick and Jackson, 1997).

[3] Cooperation in a standard Prisoner's Dilemma game, in contrast, does decrease when cooperation by either player harms a passive minority (Engel and Zhurakhovska, 2014).