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## Those outsiders: How downstream externalities affect public good provision

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### ABSTRACT

Some policy problems pit one group's interests against another's. One group may determine provision of a project (such as a dam) that benefits group members but hurts others. We introduce a model of such projects. In-group members may contribute to a common fund that benefits them as a public good. Benefits from the project may vary within the group. Provision has negative downstream externalities: contributions hurt agents outside the in-group ("Outsiders"), rendering them anti-social. Many models of social preferences predict that such externalities should reduce provision, although conditional cooperation or a preference for in-group members may counteract this. We test this model with a lab experiment using Outsiders with whom the in-group members have more and less contact. With homogeneous in-group benefits, the presence of negative downstream externalities reduces contributions by half when they have closer contact with Outsiders but not at all when they have had no contact. We introduce a rotating high-return position that allows subjects to trade favors. In this setting, contributions of non-privileged members diminish slightly when faced with the negative externality given closer contact with Outsiders, and not at all with less contact. Reciprocal giving occurs whether or not Outsiders are present.

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### Introduction

Decision-making in an environmental setting is special because it often involves externalities, including cases of public goods, and in these cases we expect people's behavior to diverge from the optimum. Sometimes these decisions are rendered more complex when a policy or project creates both winners and losers, and when not everyone has voice in the execution. Many public works projects act as public goods for a set of beneficiaries but impose costs on others. For example, a dam (Richter et al., 2010) may benefit locals but hurt people who live downstream as ecosystems and agricultural systems are degraded; or, as noted in Duflo and Pande (2007), a dam may hurt politically-unconnected locals by flooding their lands while it provides water management benefits to politically-connected people who live downstream. Public works to divert water for irrigation or other uses may have serious consequences for other uses, in cases ranging from California's proposed peripheral canal (Jennings, 2012) to diversions of water from the Mekong River in southeast Asia (Winwong, 2008). Many other environmental actions have a similar characteristic. A biomass plant (Foley, 2010) provides local stimulus but pollutes downwind towns. An inefficient ethanol subsidy (Holland et al., 2013) benefits corn state politicians who draft the measure

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but wastes taxpayer money. In the most troubling cases, the loss to losers outweighs the “public good” gain to winners. Given the power to decide on such a project, will its beneficiaries be sensitive to the harm they cause to others and society as a whole?<sup>1</sup> Additionally, the benefits provided to in-group members by many such projects may vary substantially from person to person; particularly in legislative settings, a series of overall anti-social projects may each be the pet project of one in-group member. Will that structure see greater or lesser restraint as compared to a homogeneous in-group benefit situation?

We develop a novel model of this scenario and implement that model in a laboratory experiment to study how people react when common project provision creates a large negative externality borne by others. We find that the presence of this negative externality imposes some restraint on contributions in some conditions, but that restraint is quite incomplete and depends on the group incentive structure. When in-group members have no contact with Outsiders, provision continues unabated.

This research question cannot be answered by existing work in the public goods literature (useful surveys of which include Chaudhuri, 2011; Ledyard, 1995). That literature shows that subjects cooperate more than the model of perfectly forward-looking and self-interested agents would suggest, and these results have been used to demonstrate the presence of pro-social preferences such as altruism (e.g., Dawes, 1980) or conditional cooperation (Gächter, 2007), although other motives have been advanced, such as confusion (e.g., Andreoni, 1995a; Ferraro et al., 2003; Houser and Kurzban, 2002). Settings with heterogeneous returns within the group (first studied in Goeree et al., 2002) have further demonstrated the strength of reciprocity as it is leveraged in public goods settings when in-group benefits vary as in some of our scenarios of interest (Jacobson and Petrie, in press). Reuben and Riedl (2009) use similarly heterogeneous returns to show that “privileged groups” (with a member who has incentive to support the public good) are in some ways ineffective at raising contributions because non-privileged members do not seem to respond to the privileged member's contributions, while Glockner et al. (2011) find that group members respond positively when the privileged member has a relatively high incentive but not a dominant strategy to contribute. These results do not demonstrate how subjects' cooperation changes, however, when in-group cooperation is anti-social.

Research on public bads is comparatively limited. A public bad is often treated as the mirror image of a public good: reducing the public bad of pollution, for example, is modeled as providing the public good of pollution abatement. However, the two differ. The Nash equilibrium for selfish actors in a typical public good game is to give nothing, whereas for a public bad game it may involve unboundedly large provision (Shitovitz and Spiegel, 2003). Experimental evidence suggests another difference. The change of a frame from public good provision to public bad prevention causes behavior to be less pro-social (e.g., Andreoni, 1995b; Schwartz-Shea, 1983; Sonnemans et al., 1998). Thus, although this has not been tested before, if agents decide on provision of a project that is a local public good but has global costs that make it a public bad, in-group cooperation could be relatively unhindered by concern for those costs.

When costs are incurred by members of the group of deciding agents, but other members of the group benefit, limited evidence shows that people tend to pursue self-interest. Isaac et al. (2013) use some projects that are overall pro-social and some that are overall anti-social and allow subjects to effectively contribute toward either increasing or decreasing provision; they find that subjects tend to contribute in accordance with their financial interests. Delaney and Jacobson (2013) use a rotating asymmetry, where one group member benefits each period at the expense of the other group members. They too find that subjects' contributions are mostly driven by their own payoffs and they find favor-trading in support of the public bad. Unlike our present study, however, all those affected are in the same group and have decision-making power.

Our study also relies on relevant lessons from studies of heterogeneous returns within and across groups and studies that mix benefits and costs. The intergroup conflict literature indicates that damage to other groups can actually increase within-group contributions (Bornstein, 2003; Bornstein and Ben-Yossef, 1994), and this has been attributed to an in-group bias or parochial preference (Baron, 2001). This kind of bias for the in-group can also be seen in the social identity literature, although when agents have little reason to identify with their in-group the extent of this bias seems to vary with the game being played (Chen and Li, 2009). Degrees of sensitivity to or willingness to sacrifice the well-being of those outside the in-group can also be observed in experiments that model firm decision-making (Ellman and Pezaris-Christou, 2010), oligopoly (Engel, 2007), and rent-seeking contests (Abbink et al., 2010).

Our study differs from these in that we study the effect on cooperation of costs that this cooperation will impose on people outside the in-group. The most relevant literature is the small body of experimental work on downstream externalities. Schwartz-Shea and Simmons (1990,1991) find that when playing a Prisoner's Dilemma game in which cooperation reduces contributions to a charity, subjects cooperate with each other more when they can communicate (which may increase in-group identification) and when the downstream charity is considered less deserving. However, they do not measure the effect of the presence of the outside entity and we feel the use of other ordinary subjects as outside entities is more appropriate for our research question. In very related research, Engel and Rockenbach (2011) implement a game in which subjects contribute to a local public good in the presence of “bystanders,” who are people outside of the

<sup>1</sup> A similar problem arises in valuation studies. If some survey respondents value an environmental asset more than others and they know their high values could cause a tax or fee to be levied on neighbors who value it less, will those respondents shade their reported values down or even state a value of zero to protect their friends?

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