Journal of Environmental Economics and Management 76 (2016) 51–66

Contents lists available at ScienceDirect

Journal of Environmental Economics and Management

journal homepage: www.elsevier.com/locate/jeem

Endogenous vs. exogenous regulations in the commons

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ARTICLE INFO

Article history:
Received 3 September 2013
Available online 8 December 2015

JEL classification:
C14
C7
C72
C91
Q2

Keywords:
Resource management
Endogenous rule-making
External regulations
Crowding out

ABSTRACT

It is widely believed that there is strong experimental evidence to support the idea that exogenously imposed regulations crowd out the intrinsic motivations of common pool resource (CPR) users to refrain from over-harvesting. We introduce a novel experimental design that attempts to disentangle potential confounds in previous experiments. A key feature of our experimental design is to have the exact same regulations chosen endogenously as those that are imposed exogenously. When we compare the same regulations chosen endogenously to those externally imposed, we observe no differences in extraction levels among CPR users in a laboratory experiment. We also observe no differences between weak external regulations and no regulations, after controlling for a potential confound. However, when we add communication to our endogenous treatment, we observe significant behavioral differences between endogenous regulations with communication and exogenous regulations without communication. Our results suggest that externally imposed regulations do not crowd out intrinsic motivations in the lab and they confirm that communication facilitates cooperation to reduce extraction.

Introduction

One of the eight principles for successful common pool resource (CPR) management identified by Ostrom (1992) is that resource users affected by regulations should be included in the group that can modify these regulations. Case studies from the field suggest that self-organized systems of CPR management are successful when resource users take part in the decision-making process and management often fails when it is exogenously imposed "top-down" on resource users (Ostrom, 1992). In her Nobel Prize address, Ostrom cited the experimental work of Cardenas et al. (2000) as evidence that externally imposed regulations can crowd out the intrinsic motivations of resource users to restrain their extraction.[1] Understanding if, how, and why external regulations crowd out intrinsic incentives to conserve natural resources is of tantamount importance. If external regulations do crowd out internal incentives to protect the commons, then many environmental policies may actually be doing more harm than good.

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[1] Ostrom, like many scholars who cite Cardenas et al. (2000), misinterpreted slightly how Cardenas et al. (2000) reached their conclusion. She states that "subjects [in the regulation treatment] increased their withdrawal levels when compared to the outcomes obtained when face-to-face communication was allowed and no rule was imposed" (Ostrom, 2009). However, their crowding out effect comes from a within-subjects analysis of their regulation treatment, not a between-subjects analysis between their regulation and communication treatments. That is, within their regulation treatment, Cardenas et al. (2000) observe higher individual extraction when an external regulation is weakly imposed compared to when no regulation is imposed.

http://dx.doi.org/10.1016/j.jeem.2015.11.006
0095-0696/

This paper attempts to address some of the confusion and debate in the literature on endogenous*vs.* vs. exogenous regulations in the commons with a novel experimental design. In a key departure from earlier work, our experimental design allows for the *exact same* regulations to be introduced endogenously or imposed exogenously. This addresses an important confound in the existing literature. We also introduce treatments that allow us to separately disentangle the effects of endogenous rule-making, between-subject communication, and strategic learning. Isolating these separate effects also allows us to identify potential confounds.

All of our results are remarkably consistent with each other. In our experimental context, we find no evidence that exogenously imposed regulations crowd out motivations to refrain from extraction. We show clearly that communication and strategic learning matter. If previous work has sometimes confounded communication with endogenous regulation and confounded strategic learning with exogenous regulation, then it is not surprising that existing results appear to contradict each other. Our aim is to use a simple experimental design to clear up some of this confusion. We start by reviewing the literature on external regulation and intrinsic motivation in "Literature review", before giving a detailed description of our experimental design in "Experimental design". "Results" summarizes our results and "Conclusion" concludes.

Literature review

In her survey of economic experiments on common pool resources, Ostrom (2000) highlights the importance of endogenous rule making, where common pool resource users create their own rules, giving them a sense of accountability in the management of the resource. Many field examples of successful CPR management involve resource users in the rule-making process. In Torbel, Switzerland, a small village is able to manage communal lands in high mountain meadows and forests by enforcing rules that are voted on by all citizens in the village (Ostrom, 1990). The Zanjera irrigation communities in the Philippines successfully irrigated their lands through a system that was devised and chosen by the farmers themselves in contrast to the failure of exogenously imposed irrigation systems in the Kirindi Oya project in Sri Lanka (Ostrom, 1990, 1992). However, one of the difficulties with drawing causal inferences from case studies in the field is that many of these endogenously chosen systems may have worked because of the incentives they created, not necessarily because they were self-chosen.

Complementary to the documentation of a correlation between endogenous rule-making and successful CPR management is the idea that the alternative (externally imposed regulations) can actually crowd out intrinsic incentives to conserve natural resources. A vast literature (particularly in Psychology) has examined how imposing well-intentioned rules could crowd out an individual's intrinsic motivation, sometimes leading to worse results than if the intervention did not exist in the first place.[2] A classic study on crowding out effects is Titmuss (1970), who studied the effects of monetary compensation on blood donation. Titmuss found that when individuals were monetarily compensated for donating blood, blood donation decreased. Similar crowding-out effects have been found among image-conscious volunteer firefighters (Carpenter and Myers, 2010), parents who put their children in daycare centers (Gneezy and Rustichini, 2000a), and IQ exam takers and volunteer donation collectors (Gneezy and Rustichini, 2000b).[3]

Examples of the crowding out hypothesis in the environmental domain have been examined by Frey and Oberholzer-Gee (1997) and Kunreuther and Easterling (1990). Both papers study unwanted but necessary projects (such as hazardous waste facilities) and how monetary compensation crowded out an individual's sense of civic duty to accept the projects. Frey and Oberholzer-Gee (1997) find that "when public spirit prevails, using price incentives to muster support for the construction of a socially desirable, but locally unwanted, facility comes at a higher price than suggested by standard economic theory because these incentives tend to crowd out civic duty" (p. 753). Kunreuther and Easterling (1990) find that when the risk fell into an admissible range, individuals refused any form of monetary compensation.

Within the realm of CPRs, the most influential paper on crowding out effects is by Cardenas et al. (2000), who run a CPR lab experiment with and without regulations.[4] In their experiment, groups of 8 foresters in rural Colombia played between 8 and 11 rounds of a CPR game without regulations and then played between 9 and 12 rounds of the same game with weakly enforced regulations. Their results show that resource extraction at the end of the second stage was higher than resource extraction at the end of the first stage, leading them to interpret their results as evidence that "regulation appeared to crowd out other-regarding behavior" (p. 1719). However, in a different paper, using a similar experimental design in the same field setting, Cardenas (2004) no longer finds the same result, as externally imposed but weakly enforced regulations and communication both encourage lower extraction from CPR users.[5] Other influential work on endogenous regulations in

[2] See, for example, the survey paper by Frey and Jegen (2001) and the meta-analysis by Deci et al. (1999).

[3] In a similar vein, Charness (2000) found that experimental subjects assigned as employees worked harder when their wage was determined randomly by a bingo cage than when it was determined by a neutral third-party individual: the responsibility that employees felt to work hard was "alleviated" when the wage was determined by another human being. Although an external intervention did not exist, it could be said that the employees' sense of responsibility was crowded out by the existence of an external third party in charge of determining wages.

[4] A key difference between Cardenas et al. (2000) and the experiment presented in this paper is that Cardenas et al. (2000) is a lab experiment conducted in the field, whereas our study is a lab experiment conducted in the lab. See Anderson et al. (2013) and references therein for an important discussion of differences between field and lab subjects.

[5] For a possible explanation of these conflicting findings using subjects from the field in Colombia, see Velez et al. (2010). Running experiments in 3 different locations in Colombia, the authors find that communities that live in collectively owned territories with strong government and non-