



Analysis

Does Might Make Right? An Experiment on Assigning Property Rights

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ABSTRACT

This paper investigates the role of property rights in environmental decisions and choices regarding the distribution of income in a downstream water pollution problem. The results confirm that who owns the property rights is a significant determinant of these decisions. More specifically, under certain conditions a property rights owner who suffers the consequences of negative externalities acts, on average, more environmentally friendly than a property rights owner who causes such negative externality. Similarly, when it comes to the distribution of income, the property rights owners who cause negative externalities allocate on average a larger share of the income to themselves.

1. Introduction

One of the concerns in environmental and ecological economics is the overexploitation of natural resources, especially in conjunction with negative externalities. One example of such negative externalities due to resource extraction is the use of fracking in the gas extraction industry (Hawkins, 2015). Some key problems are the negative impact of fracking on water quality, air quality, and seismic activity. Another example, more pertinent to the context of the current study, is downstream water pollution due to high-intensity farming practices upstream. A study of the Pomahaka River in Australia by Harding et al. (1999) shows that such high intensity farming indeed has significant effects on downstream river health, in particular affecting species composition. The Environmental Protection Agency (EPA, 2017) in the US states that “The National Water Quality Assessment shows that agricultural nonpoint source (NPS) pollution is the leading source of water quality impacts on surveyed rivers and streams, the third largest source for lakes, the second largest source of impairments to wetlands, and a major contributor to contamination of surveyed estuaries and ground water.”

Policy solutions to these problems focus on internalizing costs to reduce externalities and, following the tenets of the Coase Theorem (Coase, 1960), moving away from common to individual property - i.e. privatize the natural resource ownership, or change to government ownership (e.g. state parks, national parks, protected areas). However, Ostrom and Cox (2010) criticize that these approaches are often seen as a panacea to common resource and pollution problems - real world situations are vastly more complex and require tailored policy responses instead of such generalized policies.

Consider the case of pollution in Tuttle Creek Lake in Kansas, which is a reservoir on the Big Blue River. The Big Blue River flows through areas in Nebraska and Kansas characterized by intense agricultural production. It is unclear who owns the property right to water quality in this context. Farm operators consider it their right to choose the agricultural production process on their land, irrespective of the consequences of those choices on water quality due to agricultural run-off. Similarly, downstream water users consider it their right to enjoy clean water for drinking or leisure activities, such as boating, fishing, or swimming, irrespective of the constraints this imposes on the upstream agricultural producers. One way to deal with such an issue is for the government to step in and impose a set of rules and regulations. However, farm operators in the U.S. have traditionally resisted such government interference and generally command-and-control approaches are less efficient than more market-based approaches (e.g., Seskin et al., 1983; Spofford Jr., 1984; Krupnick, 1986). Due to the number of stakeholders involved, the transaction costs of negotiations would likely be significant and as such the Coase Theorem is unlikely to offer an efficient approach either. Nonetheless, this raises the question on what impact assigning clearly defined property rights has if negotiation is not possible. In particular, we are interested in this paper to determine if assigning property rights to one group of stakeholders (in this context farm operators or downstream water user) will make a significant difference in terms of environmental outcomes and income distribution, compared to assigning it to the other group. Our results support that assigning property rights to the polluter increases pollution, but only in specific situations, and favors the polluter in terms of the income distribution.

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The remainder of the paper is structured as follows. In Section 2 we outline previous research and develop the testable hypotheses. In Section 3 we discuss the experimental design and procedures. In Section 4 we analyze the results. In Section 5 we discuss the results and conclude.

2. Previous Research and Testable Hypotheses

When it comes to the experimental economics literature, the role of property rights has been studied in three well-known games: dictator games; (ultimatum) bargaining games; and trust games. Below we will discuss each of these games.

In the context of the *dictator game*, Hoffman et al. (1994) find that having earned property rights (rather than them being allocated) significantly reduces giving. This is further supported by Cherry (2001) and Cherry et al. (2002), who demonstrate that dictators display self-interested behavior in the vast majority of cases if entitlements are earned, but much less so if entitlements are allocated. Oxoby and Spraggon (2008) further analyze the impact of the receiver earning wealth through costly effort. Their results demonstrate that if the receiver earned the property right, the dictator was sharing significantly more. In general, the share of the overall available endowment going to the dictator and the frequency of self-interested behavior is sensitive to the choice set available to the dictator. List (2007) and Bardsley (2008) show that if an option to take away endowment from the non-dictator is introduced, giving is significantly lower. Cappelen et al. (2012) demonstrate that these results are independent of whether the endowment is earned. Cox et al. (2016) formally explain this as the choice set providing a moral reference point, which in turn affects the decision of acting generously.

Hoffman and Spitzer (1982) conduct a *bargaining experiment* in which two subjects bargain over the distribution of payoffs. Most pairs of subjects maximize joint profits and close to 50 percent of them end up splitting the payoff equally. In a follow-up experiment (Hoffman and Spitzer, 1985), control of the initial endowment was earned through a contest, rather than through random allocation. The resulting split of the endowment is substantially more biased toward the controller of the endowment (divider). Hoffman et al. (1994) corroborate in an ultimatum bargaining game (UBG) that the divider offers significantly less to the recipient if the entitlement is earned, rather than allocated. Guth and Tietz (1986) further show that when the role in the UBG is auctioned off, offers to the recipient are significantly lower. Gaechter and Riedle (2005) highlight that it is not only the legal right to the property that matters for bargaining outcomes, but also the moral right, earned through superior performance on a trivia quiz. Subjects with more moral rights to the pie receive a larger share.

In the standard *trust game* (Berg et al., 1995) subjects (trustors) are provided with an endowment, part of which they can choose to “entrust” to another subject (trustee) for potentially increased (or decreased) return. Fahr and Irlenbush (2000) investigate the change in behavior of trustors and trustees if the endowment is earned in a real effort task. Their results demonstrate that trustors invest more if the trustee had earned the property rights and that the trustee returns more money if the trustor had earned the property rights. Cox et al. (2009) implement a further variation to this game in that they label the basic game design given by Berg et al. (1995) as the private or common property game. In this private property game, the subject starts with owning the endowment (i.e. property) and may contribute part of it to achieve a social benefit. The common property game instead labels the endowment as owned by society and the first mover can take any amount away from this endowment for private gain (and social loss). Cox et al. (2009) find that endowments that are introduced as common property lead to slight, albeit statistically insignificant, increases in cooperative and trusting behavior. Cox and Hall (2010) conduct the same experiment, except that they increase the feeling of entitlement to the endowment, by requiring subjects to complete a real effort task to earn the endowment before the start of the experiment. This reverses the ordering of outcomes in Cox et al. (2009) - under stronger feelings

of entitlement subjects are statistically significantly more cooperative and trusting in a private property setting than a common property trust game. Coleman (2016) derive a similar result using the design by Cox et al. (2009) in Bulgaria - a post-communist country. While not exactly a trust game in the sense of Berg et al. (1995), the paper by Cox et al. (2017) bears enough similarities to be included in this section. It introduces a sequential move game to measure reciprocity by a second mover in response to acts of commission or omission by a first mover. Their findings support that earning the endowment significantly affected the behavior of the first mover, but did not affect second movers' reciprocal response.

It is important to note that most of the authors mentioned above define property rights as earned endowment, in contrast to an allocated endowment. To the best of our knowledge, Cox et al. (2009), Cox and Hall (2010), and Coleman (2016) are the first authors that explicitly test the impact of different property rights regimes rather than earned versus allocated endowment. In this paper, we further investigate this issue. In contrast to their papers we do not have different property right regimes but focus on the impact of who owns the private property right. Further, where Cox et al. (2009), Cox and Hall (2010), and Coleman (2016) analyzed a context free trust game, we instead consider a contextualized negative externalities game that is based on a dictator game. In particular, we investigate the difference in behavior if property right owners play different roles in society.

We argue that it is quite important to consider the roles of economic agents, because in the real world people do not make choices in a context free environment – their opinions, attitudes, and personality are mostly formed by their environment and their roles therein and hence might have a significant impact on the choices they are making. This goes back to the argument by Ostrom and Cox (2010) – we need to consider the specific context for effective policy design rather than try to develop (non-existing) panaceas. This paper tests experimentally whether in an upstream-downstream water pollution problem without bargaining (i.e. cases in which the Coase Theorem does not apply), the initial assignment of property rights matters when it comes to the level of pollution chosen and the distribution of income between property right owner and non-owner. This may provide further insights into where and how assigning property rights may lead to desirable outcomes and thus helps address the concerns raised by Ostrom and Cox (2010).

Ex-ante, it is unclear how far the role a person plays in society affects their pro-environmental behavior. In particular, we are interested in the impact of the property rights belonging to a polluter compared to them belonging to the victim of pollution, controlling for the income effects of the pollution decisions. Since environmental problems are more salient to the latter, we hypothesize that these individuals will feel more directly affected by environmental degradation and perhaps are better able to empathize with nature and fellow human beings and will act on that empathy by protecting the environment, even at a personal cost.

Hypothesis 1. Assigning property rights to the victim of pollution will lead to lower levels of pollution than if the property rights are assigned to the polluter.

Similarly, this paper investigates how far the role a person plays in society affects the income distribution. It stands to reason that a person that has the property rights to a resource will allocate the largest share of the income coming out of that resource to self. *Ex-ante* it is unclear, however, in how far the role being played affects the size of that share. We conjecture that, similar to Hypothesis 1, those subjects that are typically more exposed to negative consequences of the decisions of others, are perhaps better able to empathize with fellow human beings and thus be more inclined to share a larger portion of the income out of the resource.

Hypothesis 2. Assigning property rights to the victim of pollution will lead to a more equal distribution of income than if the property rights are assigned to the polluter.

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