Me, the Poor or the Environment: Evaluating the Relative Strength of Social and Environmental Preferences

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Abstract

The debate over the relationship between economic growth and the environment dates back many decades. However, it increasingly has political repercussions as economic opportunities have diminished for much of the population in developed countries. The early literature sought to resolve one way or the other whether there was an aggregate win-win. However, this is too simplistic. There are likely many opportunities where the economy and environment can improve in tandem. But, there are also many other situations where there is an inherent and unavoidable tradeoff, particularly if one is realistic about spatial and temporal boundaries determined by politics. Also, politics can make redistribution when the poor face most of the burden of environmental policy unrealistic. Our objective in this paper is to answer two questions. First, do people with strong environmental preferences also have strong pro-social preferences? Second, do people that fit this description favor achieving environmental or social goals when there is an unavoidable tradeoff? We develop a within-subject laboratory experimental design that measures environmental and social preferences, and then uses these results to predict decisions in a variation of the dictator game that creates a social and environmental tradeoff while permitting selfishness. We find that the conflict between social and environmental goals is largely intra-person as opposed to inter-person. Also, social goals appear to receive moderately higher weight than environmental goals. Results potentially inform voting behavior and political action more generally.

Introduction

The global recession in 2008 and continued growth in income and wealth inequality in many nations has renewed concern over the level and distribution of the burden of environmental policies. In the United States, the political will to remove many regulations administered by the Environmental Protection Agency culminated in the 2016 Presidential Election. Perceptions of the economic impacts of environmental regulations on the coal industry appear to have played a large factor in voting decisions. Also in 2016, the long-simmering political controversy from designating federally owned land for environmental protection culminated with the armed take-over of the Malheur National Wildlife Refuge near Burns, Oregon. There are also myriad fights over efforts to remove dams to allow fish passage and other environmental motivations.

This current political controversy is informed by the economics literature that considers whether achieving environmental goals necessarily requires tradeoffs in economic activity. A way to condense the debate is to ask whether it is more valid to caste the relationship between economy and environment with the standard production possibilities frontier shape or in the U-shape of the environmental Kuznets curve. Porter and van der Linde (1995) argue that the environment-industrial competitiveness debate is a false choice once one takes a dynamic view of environmental regulation. Stern, et al. (2006) concludes that in the context of climate change, there is an economic price to pay for reducing GHG emissions, but it is small. Adams et al. (2004) identifies situations where there is an unavoidable conflict between biodiversity and local poverty reduction.

Another way to view the economy-environment tension is that there is only a trade-off if one takes a narrow view of economic outcomes by sticking to traditional measures of gross domestic product (e.g. Costanza et al., 2009). This perspective received a substantial push forward with the Sarkozy Commission led by Nobel Prize winning economists Joseph Stiglitz and Amartya Sen

(Stiglitz, Sen, and Fitoussi, 2010). One of five recommendations of the Sarkozy Commission was to find ways to incorporate social well-being into GDP type measures including non-market outcomes related to the environment. There are a number of quantitative methods for doing so. One of them is subjective well-being, which has developed rapidly over the past decade (Krueger and Stone, 2014). The non-market valuation literature in environmental economics provides substantial evidence that well-being for many people is improved by knowing the environment is healthier. Similarly, behavioral economists have shown that many people are emotionally affected by how well others are doing. Given these findings, the best case that one can hope for is to try to improve environmental health and reduce the well-being of others. However, it is important to consider policy scenarios where there are unavoidable environment-social tradeoffs at least within some spatial and temporal bounds that are politically meaningful.

Our objective in this study is to use laboratory experiments and a within-subject experimental design to understand better peoples' preferences for achieving social versus environmental goals. Studies most closely related to this paper have considered how acceptable people find environmental policy as a function of its equity and efficiency. Atkinson, Machado, and Mourato (2000) focus solely on equity to assess individual preferences over 'who should pay' for achieving an environmental outcome. A component of this question is a consideration of 'ability to pay'. Dietz and Atkinson (2010) consider preference strength for equity versus efficiency in two different contexts that are local and intra-generational versus global and inter-generational. They also make subjects aware of the potential that the burden of environmental policy falls on the poorest. We seek to extend this literature in two ways. First, we focus on environmental policies that are regressive and where there is no mechanism for redistributing the burden. An attribute of each choice set in Dietz and Atkinson is to lower the degree of regressivity of the policy via

redistribution. Second, we measure the strength of individual social preferences using a set of dictator games that permit different motivations for cooperation. Thus, we directly measure the strength of selfishness in each subject, and in a way that reveals whether they are more concerned with improving the lot of the worst off or are better described as social efficiency maximizers.

Our experiments are frame around management of the Columbia River for instream versus out of stream demands. In the Pacific Northwest of the United States, the electricity generating dams are currently operated to maximize hydropower production. There is the potential to reorient spill to improve water conditions to benefit fish populations, which includes salmonids. However, this would necessarily result in a loss in electricity generation, as well as reduced water for irrigation. Increases in energy and food prices are regressive, meaning that they fall disproportionately on the poor as a share of income.

We use laboratory experiments to (1) quantify the correlation between environmental and social preferences in a within subject design, and (2) quantify the willingness to substitute between achieving environmental outcomes versus inequality in living standards. Our experimental design is based on three sets of choices (or games). We use both a stated and revealed approach for measuring environmental preferences. We use a subset of the games described in Charness and Rabin (2002) to quantify social preferences in terms of degree of selfishness and the motivation for cooperation. We then have the subjects play a game where they are required to face a tradeoff between an environmental goal and reducing inequality in the pay of those playing the game. The social preference games and environmental choice games are 'cold' in that there is not interaction with other subjects in the room. This is meant to provide as clean of a measure of underlying preferences as possible. These two components are always run first, but we do alternate their order across sessions. The 'tradeoff game' is hot, so subjects are informed of the decisions of others.

This takes the form of a dictator game and there are two forms of it. Each subject gets the opportunity to play the dictator in both forms. In the next section, a more detailed description of the experimental design is provided. We then provide results, and then discuss how they fit into the larger literature.

Experimental Design

Charness and Rabin develop a set of simple dictator games that disentangled various motivations for displaying cooperative behavior. For example, some people may be willing to sacrifice their own pay in order to improve the outcome for the person that is worse off (maximin). Others may be more willing to sacrifice if it increases the total size of the pie (social efficiency). We use the set of the games described in Charness and Rabin that do not consider reciprocity since it is not fundamental to our general research question. We selected a set of six dictator games that are then used to classify each participant as selfish or as a cooperator (Andreoni and Vesterlund, 2001; Roe and Wu, 2009). Rather than map each subject into a binary selfish/cooperator categorization, we develop a quasi-continuous variable that reports the percentage of time that the subject maximized his or her own pay. Given that there are six questions, our selfishness score can take on values of 0, 0.2, 0.4, 0.6, 0.8, and 1. A person that is low on this selfishness scale is motivated by many cooperative goals.

Environmental preferences are quantified using stated preference questions where subjects are asked to choose which of three combinations of three goods they prefer (electricity prices, salmon populations, and algae levels) (Carson and Louviere, 2010). Salmon and algae can take on values of low, medium, and high. The best environmental outcome is associated with high salmon and low algae. The third characteristic was the home electricity price that the subject was told they

would face. Thirty unique policies were created. Choice sets consisting of three options were constructed so that there was no dominated or dominant option. For example, it was never the case that an option had the lowest electricity price while also having the better salmon and algae combinations than the other two alternatives. An example of one choice is shown in Figure 1. This alternative specific decision framework is a well-developed methodology in environmental economics literature where the random utility model provides the theoretical foundation for the discrete choice econometric model. The data is set up so that there is an individual row for each good that the subject had a choice of picking. The dependent variable is binary and coded 1 if that good was chose, and 0 otherwise. Salmon and algae levels were represented as explanatory variables using effects coding. The worst outcome for each (low salmon, high algae) was scored as a -1. Medium was coded as 0, and the best outcome for each was coded as +1. Electricity price was coded directly. Our data analysis included 100 subjects, so the regression data set contains 1,800 rows (100x6x3).

The third component of the experiment is another set of dictator games that restrict the subject's ability to meet both social and environmental goals. The set-up is as follows. Each subject is given a dollar endowment. The exact amounts of the endowments were varied across sessions. No two subjects receive the exact same endowment. Those in the upper half of endowments are the dictators. The bottom half are passive. The dictators are told that they have three choices. They can 1) keep all of their endowment, 2) give up $1 of their endowment and donate to an environmental charity, or 3) they can give $1 of their endowment to a subject in the bottom half. While those in the top half of endowments are always decision makers, the spread between the top half and bottom half of endowments is varied across treatments ranging from $2 at the lowest end to $20 at the highest. It was made clear to subjects that the environmental donation

was a real donation that would be made. Also, they were told it would be to the environmental advocacy organization American Rivers, which is very active in the Pacific Northwest. There were two variations of this game. In one version the dictator is paired with a specific other player that was in the bottom half of the endowments. In the other version, they have the option of giving up $1 that is evenly split among all of those in the bottom half of endowments that were not dictators in the game. Both version of this game were played in each session. In addition, each game is played twice so that each subject plays the role of dictator in each. We will refer to these as the "matched" and "pooled" tradeoff games in the results.

The within-subject design and the three components to the experiment allows us to achieve two main aims. First, we can quantify the correlation between social and environmental preferences. In other words, are people with strong environmental preferences also more likely to be cooperators rather than selfish-types? Second, we can use the results of the social and environmental games as predictors in the third component to assess the relative strength of environmental and social preferences when there is an unavoidable tradeoff between meeting environmental and social goals. This conforms to our interest in scenarios where environmental policies are regressive, in that the costs are borne by those with the lowest incomes, and redistribution that would permit meeting equity and efficiency goals is infeasible.

Results

Ten sessions were completed with ten subjects in each session drawn from the student population on the Pullman campus at Washington State University from June to December 2016. Students were recruited from a diverse range of courses across disciplines to avoid having an overly represented set of interests. University students are not representative of the entire population of the

Columbia River Basin region. However, the fact that most students have a familiarity with the Columbia River, irrigated agriculture, outdoor recreation, and other benefits provided by this natural resource is important for eliciting responses that are more meaningful during the course of the experiment.

Results from the social preference games are shown in Table 1. Game 1 was the only one where the dictator's pay does not vary, which isolates competitive versus social efficiency preferences. Fifty-eight percent maximized the size of the pie, while the remainder preferred to reduce the other player's pay. Game 2 varies game 1 slightly by introducing a pay penalty for achieving social efficiency. Only 29% sought to maximize the total pay if they had to sacrifice even a small amount. Game 3 shows that a small number of subjects were disadvantaged inequality averse. Games 3 and 4 provide an important contrast. In both cases the dictator can give up the same amount of money to increase the pay of the other person. Many fewer people are willing to do so when this results in the other player going from less to more money than the dictator. In Game 6, nearly 40% of subjects were willing to sacrifice a significant amount of money if it greatly increased the pay of the other person. The ability of the Charness and Rabin games to disentangle pro-social behavior is their main advantage, but it does then introduce a lot of flexibility in how to represent each person. Our approach is to create a selfishness scale that is the number of games out of five that they chose the selfish option. Results for our 100 subjects are shown in Figure 2. Results are promising in that we have significant amounts of variation across subjects.

We now move to describe results from the environmental choice games. To summarize from the experimental design section, each of the 100 subjects made six choices over three alternative policy options. Each policy option described algae level, salmon level, and electricity price. The regression data set consists of 1,800 observations. The regression model is estimated in

the alternative-specific conditional logit specification following McFadden (1974). While this permits both choice specific and individual specific covariates, it is simpler to consider whether selfish types are less willing to pay for environmental outcomes by stratifying the sample. We do this according to the selfishness score and then look at the sign and significance of the coefficient on the electricity price.

Results are shown in Table 2. The first model is for the full sample of 100 subjects, which shows that sign and significance of coefficient estimates make general sense. Subjects are more likely to pick a bundle that has less algae, more salmon, and a lower price. We test our hypothesis that people with strong social preferences also have strong environmental preferences by comparing the three models below. The sample of subjects with a selfishness score of less than 0.5 had selfishness scores of 0, 0.2, or 0.4. This means that they maximized their own pay in fewer than half of the social preference games. The regression is also run for subjects that maximized their own pay more than half the time. A more extreme sub-sample is created by including only those that maximized their own pay in every or all but one game (>0.7). There is no clear trend for the algae and salmon moving from less to more selfish. However, there is a clear trend, which is also meaningful in terms of magnitude, showing that subjects that are more selfish are more sensitive to electricity price. The coefficient on price is -0.04 for the most selfish compared to -0.014 for the least selfish group.

The implication of this finding is that the tension between meeting social and environmental goals is most strongly felt "within subject" as opposed to being realized as interpersonal conflict. Consider a situation where voters are asked to rank the three alternatives of meeting environmental goals, social goals, or neither. What these results show so far is that it is unlikely that all voters will have a very strong preference in the complete ordering. Rather, there is a group of selfish/non-

environmentalists that are unwilling to give up much of their own pay to meet environmental or social goals. There is also another group that is very willing to give up something to meet environmental or social goals, but they may find it challenging in prioritizing one over the other. This has obvious extension in the context of Arrow's Impossibility Theorem because what may initially appear like a rank ordering of three choices is actually only two choices for most people.

The final component of the experiment was designed to identify whether 1) selfish types also maximize their own pay when environmental outcomes are explicitly included as an alternative, and 2) whether environmental or social preferences are stronger for subjects that appear to have both. Environmental donations were a minority but common choice. Fifty-seven out of 190 (30%) of subjects donated. A simple discrete choice probit regression where the dependent variable is equal to 1 if they kept their full endowment shows a strong correlation with their selfishness score. The coefficient estimate is statistically different from 0 at greater than 99% confidence level. It is also meaningful in magnitude. Going from the lowest to highest selfishness score increases the probability that they keep their full endowment by 40%. A similar regression model with environmental donation as the dependent variable shows no correlation with selfishness score.

Conclusions

In this paper we report research aimed at answering two questions. First, are people with strong environmental preferences more likely to have strong pro-social preferences? We find evidence that this is the case based on a laboratory experiment designed to measure both types of preferences in a cold framework where there is no interaction between subjects. Following from our first finding, we test whether the measures of preferences from the cold games predict behavior

in an interactive dictator game where subjects are informed about the decisions of their paired subject. We find a strong correlation between subject selfishness score from the cold game and selfishness in the final tradeoff game. Also, our results show generally that achieving social goals appears to be a stronger motivation than environmental goals.

Our findings have potentially interesting implications in two areas. The first, and most obvious, is in explaining voting behavior and political action more generally. The tentative interpretation of our findings is that support for environmental action is likely to be limited if the burden falls on the disadvantaged in society. The example from our experimental design is changing dam operations on the Columbia River to benefit fish populations and reduce greenhouse gas emissions. A side-effect would be lower hydropower production and higher electricity prices to households throughout the Pacific Northwest. Relative to income this would only affect the poorest in the region. Our findings show that people that would likely support the environmental goals would be significantly troubled by the social burden of the action and would show little support in the absence of some additional compensation. In fact, there has been media attention around this idea where young people avoid being called environmentalists because of perceptions that the environmental movement has been tone-deaf towards the effect of environmental policies on the poor ("Millenials: We Help the Earth But Don't Call Us Environmentalists", National Public Radio, October 11, 2014).

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Tables

Table 1. Social Preference Dictator Games and Results.

Game	Player B's choice (A,B)	Proportion that chose left
1	(400,400) vs. (750,400)	0.42
2	(400,400) vs. (750,375)	0.71
3	(800,200) vs. (0,0)	0.81
4	(300,600) vs. (700,500)	0.56
5	(200,700) vs. (600,600)	0.31
6	(0,800) vs. (400,400)	0.39

Table 2. Results from alternative-specific conditional logit regression model for environmental choice decisions for different samples based on subjects' selfishness score from social preference games.

	Coefficient	**s.e.**	**z**	**p-value**
Full sample				
Alga	0.992	0.083	12	<0.001
Salmon	0.847	0.078	10.88	<0.001
Electricity Price	-0.024	0.004	-5.54	<0.001
N	1,800			
Selfish score < 0.5				
Alga	0.876	0.118	7.45	<0.001
Salmon	0.789	0.119	6.65	<0.001
Electricity Price	-0.014	0.007	-2.15	0.031
N	792			
Selfish score > 0.5				
Alga	1.092	0.117	9.35	<0.001
Salmon	0.889	0.105	8.5	<0.001
Electricity Price	-0.031	0.006	-5.31	<0.001
N	1,008			
Selfish score > 0.07				
Alga	1.21	0.167	7.27	<0.001
Salmon	0.776	0.14	5.56	<0.001
Electricity Price	-0.043	0.009	-4.99	<0.001
N	558			

Figures

	Profile 1	Profile 2	Profile 3
	Low Algae Low Salmon	Low Algae High Salmon	High Algae Low Salmon
Algal Level			
Juvenile Salmon (Smolts)			
Monthly Electrical Energy Bill	$70	$80	$40

Figure 1. Example of a choice in the stated preference experiments.

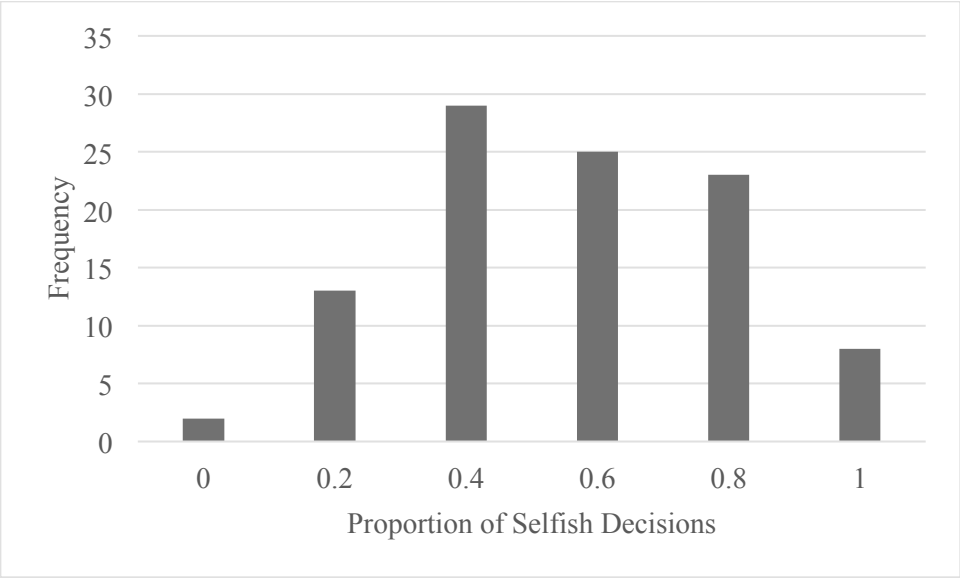

Figure 2. Count of number of subjects by the number of games out of six that they picked the choice that maximized their own pay.