**COST UNCERTAINTY, FAIRNESS AND POLITICAL SUPPORT  
FOR SUBSIDIZING RENEWABLES**

[Stefan Traub, Helmut-Schmidt-Universität, +49 4 6541 2865, stefan.traub@hsu-hh.de]

[Ole Kutzschbauch, Helmut-Schmidt-Universität, +49 4 6541 3194, kutzscho@hsu-hh.de]

## Overview

The consequences of global warming and its negative effects on humanity are generally considered to be widely accepted by the public. In winter 2015 within the framework of COP21 in Paris, 195 countries agreed to keep global warming to well below 2 degrees Celsius. For a long time the German government have played a leading role in promoting a transition of the energy sector away from fossil towards renewable sources. Its main vehicle to economically support renewables was introduced by the German Renewable Energy Act (EEG) in 1999. EEG highly subsidizes the use of renewable energy sources by means of feed-in tariffs for renewable energy producers. The transition from other to green energy sources is financed by a levy on the electricity price for all end consumers. Recently, Frondel et al. (2015) demonstrated that energy prices for private households nearly doubled since the Renewable Energy Act was enacted. Further increases of uncertain value are to be expected.

Due to the EEG’s regressive character, it is clear that rising costs will have the strongest impact on poor households and thereby open a social dimension in the discussion about the energy transition in Germany. The problem of a fair distribution of the costs of subsidizing renewables is a question that still needs to be answered.

The present paper reports on a quasi-field experimental analysis of consumers’ fairness preferences with regard to sharing the costs of subsidizing the use of renewables among the society. In a series of incentivized choice experiments, we systematically analyze subjects’ distributional preferences. In particular, we focus on the interaction between fairness and risk preferences by treating subjects both with riskless distribution problems and distributions problems under cost risk and income uncertainty.

## Methods

There is a considerable experimental evidence that subjects care about the fairness of distributions (see for example, Fehr and Schmidt (1999), Bolton and Ockenfels (2000) or Charness and Rabin (2002)). These models allow us to test social preferences in simple distribution experiments.

We follow and verify the implications of such models using a cost-distribution experiment in a household-energy-consumption framing. Subjects are randomly assigned to small artificial societies consisting of heterogeneous income groups (low, medium, high). Within these societies, subjects choose their favorite cost distribution between groups. In order to reduce hypothetical bias, we analyze individual choice behavior using a strictly neutral cheap talk script combined with high monetary incentives (Cummings and Taylor (1999)).

The costs for subsidizing renewables to be borne by the society are certain in the baseline treatment and uncertain in the cost uncertainty treatment. Subjects choose simultaneously and anonymously how they want to divide the costs between the three income groups by fixing a parameter of a distribution scheme, where the resulting energy tax can be regressive (), proportional () or progressive). The payoff mechanism is as follows: One decision per group is randomly selected for payoff; the median voter’s tax scheme is applied and subjects’ receive their respective incomes after deducting the tax. Furthermore, subjects are asked for sociodemographic data and attitudes towards the “Energiewende” (energy turnaround). Our working hypothesis are as follows:

**H10:** *Individual payoff-maximizers vote for a tax scheme that minimizes their tax burden. In a right-skewed income distribution this leads to a more progressive cost distribution as the low and medium income groups will shift the burden towards the rich income group.* vs.**H1A:** *Subjects decisions are not only based on selfish motives but also influenced by fairness and efficiency preferences. This leads to more support of progressive cost sharing by rich groups and more support of proportional cost-sharing by low and medium income groups.*

**H20:** *Distributional preferences are not affected by risk.* vs*.* **H2A:** *Cost uncertainty crowds out social preferences and therefore leads to a more regressive cost-sharing schedule*.

## Results

We collected 149 observations from non-standard subjects in the field. 74 observations under certain costs and 75 observations in the cost uncertainty scenario.

Descriptive results indicate that the median voter’s tax scheme under cost-certaintys in the baseline treatment leads to a tax with proportional burden share (median-) for the households. This result is consistent over all three households. With the introduction of cost uncertainty, the favored tax scheme shift towards a more regressive distribution among the households (median-).

We derive more detailed results from OLS regression analysis of several variables on the (logit transformed) as the dependent variable. We find highly significant support for the negative impact of cost uncertainty on social preferences. Furthermore, there is statistically significant evidence for a self-serving bias in particular among the high incomes groups who prefer a more regressive cost distribution. Looking for personal characteristics, we find that risk averse subjects as well as females have a tendency towards a more regressive distribution preferences.

Our results reject our null hypotheses H10 and H20. Distributional choices significantly differ from the optimal choices under the assumptions of selfish preferences. With the introduction of cost uncertainty, especially the high income groups vote for tax scheme that reduce their individual burden and increase the burden of the other household groups. This is a clear indication for a lack of social preferences under cost uncertainty.

## Conclusions

In this paper, we have experimentally studied the distributional preferences of the respondents in the context of financing subsidies for renewables. As far as we know this paper is the first of its kind, where distributional preferences in the context of the climate change are examined in experiments.

We find that subjects generally follow the ability-to-pay principle. The participants have voted under certain costs for a proportional distribution, where all social groups contribute their share to the total costs without overburden a single group.

Under cost uncertainty, the society moves from a clear proportional distribution towards a more regressive tax scheme. This behavior can be explained by the effect of risk on social preferences. This is line with results of papers testing for social preferences under uncertainty in a more general context (see for example Brock et al. (2013) or Cettolin & Riedl (2013).

Our results have important policy implications for the acceptance of subsidizing renewables. If the society is certain that the goals of public projects like the energy transition will be achieved as planned and the costs are relatively certain a proportional distribution is preferred. This contradicts the current financial mechanism. However, if the costs for the ambitious objectives of the government are perceived unstable, we see a movement towards a capitation of the costs.

This leads to a dilemma for the politicians. On the one side, they like to ensure the society that the costs are certain. Under these circumstances regressive finance mechanisms (like the EEG surcharge) would be the wrong instrument to ensure public support. On the other side, a commitment by the government that the cost promoting renewables are uncertain would support a levy on electricity prices as a useful instrument but certainly would reduce the trust in the success of the global warming policy and in the government themselves. Therefore, future research should explore the underlying principles for the distributional choices in more detail and especially focus on the role of cost uncertainty to the decision making process.

## References

Bolton, Gary E., and Axel Ockenfels. "ERC: A theory of equity, reciprocity, and competition." *American economic review* (2000): 166-193.

Brock, J. Michelle, Andreas Lange, and Erkut Y. Ozbay. "Dictating the risk: Experimental evidence on giving in risky environments." *The American Economic Review* 103.1 (2013): 415-437.

Charness, Gary, and Matthew Rabin. "Understanding social preferences with simple tests." *Quarterly journal of Economics* (2002): 817-869.

Cettolin, Elena and Riedl, Arno, Justice under Uncertainty (November 2, 2014). Netspar Discussion Paper No. 07/2013-045 (revised October 2014). Available at SSRN: <http://dx.doi.org/10.2139/ssrn.2354911>

Cummings, Ronald G., and Laura O. Taylor. "Unbiased value estimates for environmental goods: a cheap talk design for the contingent valuation method." The American Economic Review 89.3 (1999): 649-665.

Fehr, Ernst, and Klaus M. Schmidt. "A theory of fairness, competition, and cooperation." *Quarterly journal of Economics* (1999): 817-868.

Frondel, Manuel, Stephan Sommer, and Colin Vance. "The burden of Germany’s energy transition: An empirical analysis of distributional effects." *Economic Analysis and Policy* 45 (2015): 89-99.