

# ***HOW MUCH ARE INDIVIDUALS WILLING TO PAY TO OFFSET THEIR CARBON FOOTPRINT? THE ROLE OF INFORMATION DISCLOSURE AND SOCIAL NORMS***

Joachim Schleich, Grenoble Ecole de Management, +33 45680-6619, joachim.schleich@grenoble-em.com  
Sven Alsheimer, Fraunhofer Institute Systems & Innovation Research, +49 7216809-565, sven.alsheimer@isi.fraunhofer.de

## **Overview**

In this paper we examine individuals' individual willingness to pay (WTP) to offset their carbon footprint. In particular, we analyse the causal effect of individuals' (i) receiving information about the greenhouse gas (GHG) emissions associated with these activities, and (ii) receiving in addition also information about the difference between their carbon footprint and the GHG emissions compatible with climate neutrality. We further relate individuals' WTP to offset their carbon footprint to a broad set of co-variates including attitudes, social norms, carbon literacy, the individual carbon footprint, and socio-demographic characteristics. To this end, we conducted a demographically representative survey among households in Germany. In particular, the survey included a carbon footprint calculator which covers the main individual activities (i.e. electricity consumption, heating, transportation, and nutrition) causing individual greenhouse gas emissions

Our paper thus contributes to different streams of literature. First, offsetting greenhouse gas emissions essentially means a voluntary contribution to the public good climate protection. If there was a high potential for such voluntary contribution, this might alleviate the need for coercive emission reduction measures by governments (e.g., Diederich and Goeschl, 2014). Thus, estimating the WTP for such offsets and gaining a better understanding of the factors related to this WTP provide valuable insights for policy making. The extant literature to estimate individual WTP to lower or to offset greenhouse gas emissions yields a wide range of estimates ranging from zero (e.g., Diederich and Goeschl, 2014) to more than hundred euros per ton of CO<sub>2eq</sub> (e.g., Alberini et al., 2018). To elicit WTP, most studies employ small and non-representative samples in laboratory experimental settings (e.g. in public goods games) or stated preferences methods such as discrete choice experiments. Exceptions include Diederich and Goeschl (2014) and Löschel et al. (2013). Yet, none of these studies relates individual WTP to the actual carbon footprint. Few field experimental studies relate WTP to the actual footprint, yet these are limited to particular activities such as transportation (Kesternich et al., 2016) and electricity (Jacobsen et al., 2012). In addition, it is not clear to which extent findings from non-representative samples may be transferred to the general population.

Second, disclosing the carbon footprint to individuals addresses incomplete information, making individuals' contribution to climate change more salient and more concrete, and providing a direct link between their activities and the detrimental environmental effects associated with these activities. Thus, receiving information about the carbon footprint raises individuals' awareness/consciousness of the environmental impact of their own activities.

Third, providing information about the size of the individual carbon footprint in relation to future targets, speaks to the literature examining the role of social norms and of goal setting to nudge/encourage/get individuals to behave environmentally friendly. Social norms may be defined as the 'predominant behaviors, attitudes, beliefs, and codes of conduct of a group' (Cialdini and Jacobson, 2021). Empirical studies typically find that injunctive social norms (i.e. what others think one should do) and descriptive social norms (i.e. what others do) affect climate-relevant behaviors such as household electricity consumption and thermal heating demand (e.g. Allcott, 2011; Allcott and Rogers, 2014; Allcott and Kessler, 2019). In this context, climate targets may be characterized as codified or explicit social norms. Relatedly, from the perspective of individuals, climate targets may be characterized as nonbinding and non-monetary relevant goals. Empirical studies have found that asking individuals to set energy savings goals and provide them with feedback may lead to lower energy consumption (e.g. Harding and Hsiaw, 2014; Brandsma and Blasch, 2022).

## **Methods**

We took a demographically representative sample of the adult population in Germany in October of 2020 (N = 1005). The survey included a carbon footprint calculator to estimate individual GHG emissions pertaining to electricity consumption, heating, transportation, and nutrition in 2019. Upon completion of the carbon footprint calculator, participants were randomly assigned into a control group (T0) and two treatment groups (T1 and T2). Individuals in T0 received no information about their carbon footprint. Individuals in T1 were informed about their carbon footprint. Individuals in T2 were additionally informed by how much their carbon footprint in 2019 exceeded the footprint compatible with climate neutrality. We then asked participants from all three groups, how many euros at most they would be willing to pay privately to offset their GHG emissions in 2019 as calculated by the carbon footprint calculator. To mitigate hypothetical bias, we employed a strong cheap talk design.

To analyze the data, we estimated a double-hurdle model which explicitly models the decision of whether to pay for the carbon footprint at all (first hurdle, extensive margin) separately from the decision of how much to pay (second hurdle, intensive margin).

## Results

The results suggest that providing information about the carbon footprint (T1) increases the average WTP pay by about 20 euro (i.e. about 40%), and the conditional WTP (i.e. intensive margin) by about 26 euro (i.e. about 30%). In comparison, disclosing information about the carbon footprint does not appear to affect the extensive margin. For our social norm treatment (T2), we find no statistically significant effects on the extensive and intensive margin. Across all groups, individuals are on average willing to pay about 11 euro per ton of CO<sub>2eq</sub>.

In addition, we find that younger participants, women, individuals believing that offsetting is an effective means to protect the climate, and participants who are well aware and informed about climate change are more likely to state a positive WTP. Conditional on paying a positive amount, participants who are younger, male, richer, better educated, believe that offsetting is an effective means to protect the climate, are well aware and informed about climate change, and who have stronger environmental preferences are associated with a higher stated WTP. Surprisingly, we find no evidence that the size of the carbon footprint is related with the extensive or intensive margin.

## Conclusion

Our findings on the level of individual WTP imply that the potential for such voluntary contribution to the global public good climate protection is not high enough to meet climate targets. Thus, there is a need for coercive emission reduction measures by governments. The findings further suggest that making the individual carbon footprint salient may substantially increase individuals' WTP to offset their carbon footprint. Finally, the 'no result' on the role of social norms may suggest that if goals set are too ambitious they may cause frustration and hence be ineffective.

## References

- Allcott, H., 2011. Social norms and energy conservation. *Journal of Public Economics*, 95(9), 1082-1095.
- Allcott, H., Kessler, J. B., 2019. The welfare effects of nudges: A case study of energy use social comparisons. *American Economic Journal: Applied Economics*, 11 (1), 236-276.
- Allcott, H., and Rogers, T., 2014. The short-run and long-run effects of behavioral interventions: Experimental evidence from energy conservation. *American Economic Review*, 104 (10), 3003-3037.
- Alberini, A., Bigano, A., Ščasný, M., and Zvěřinová, I. (2018). Preferences for energy efficiency vs. renewables: What is the willingness to pay to reduce CO2 emissions? *Ecological Economics*, 144, 171-185.
- Brands, J., S., Blasch, J., E., 2022. One for all? The impact of different types of energy feedback and goal setting on individuals' motivation to conserve electricity. *Energy Policy* 135, 110992.
- Cialdini R. B., and Jacobson, R. P., 2021. Influences of social norms on climate change-related behaviors. *Current Opinion in Behavioral Sciences* 42, 1-8.
- Diederich, J., Goeschl, T., 2014. Willingness to pay for voluntary climate action and its determinants: field-experimental evidence. *Environmental and Resources Economics* 57 (3), 405-429.
- Harding, M. and Hsiaw, A., 2014. Goal setting and energy conservation. *Journal of Economic Behavior and Organization*, 107(PA), 209-227.
- Jacobsen, G. D., Kotchen, M. J., Vandenberg, M. P., 2012. The behavioral response to voluntary provision of an environmental public good. Evidence from residential electricity demand. *European Economic Review* 56, 946-960.
- Kesternich, Martin, Daniel Römer und Andreas Löschel, 2016. The Long-Term Impact of Matching and Rebate Subsidies when Public Goods are Impure: Field Experimental Evidence from the Carbon Offsetting Market, *Journal of Public Economics* 137, 70-78.
- Löschel, A., Sturm, B., Vogt, C., 2013. The demand for climate protection –an empirical assessment for Germany. *Economic Letters* 118, 415-418.