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All in it together: A multilevel model to explore household characteristics of PV adoption intentions in Germany

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Abstract

The transition to a net-zero economy requires a better understanding of the decision-making pathways for homeowners in adopting Low Carbon Technologies (LCTs). The decision-making process for households in the uptake of LCTs, particularly those with high upfront costs such as rooftop photovoltaic systems (PV) has been shown to be strongly driven by cost factors and household socioeconomic circumstances. However, as the price of PV-systems continues to decline, information-based drivers or other non-monetary factors may play a more important role in encouraging households to transition towards this low-carbon option. Within this context, recent literature has attempted to identify non-monetary drivers influencing the diffusion of PV systems, often finding that spatial factors, for example the number of proximate positively affects adoption rates. In response, research has begun to examine the potential role of peer effects on PV adoption. However, clustering may not necessarily demonstrate peer effects, but instead spatial assortment, whereby like-minded individuals live side by side.

As residential PV becomes increasingly affordable, unpicking individual versus area level effects and analysing their potential interaction is increasingly important to ensure widespread uptake. Within this context, this paper uses a multilevel model (also known as mixed effects or hierarchical modelling) to identify the relative importance of household-level and area-level factors, as well as their potential interaction on PV adoption intention for a representative sample of 1,800 homeowners in Germany. We hypothesis that peer effects, measured as a function of PV uptake at the zipcode level, is a significant predictor of intention to adopt PV; however, within the context of the theory of planned behaviour this relationship is stronger for households with higher socioeconomic status due to the activation of social norms. It is only using a multilevel model that such effects can be approximately disentangled.