Pro-environmental choices and energy poverty: an experimental study on the combined effect of financial incentives and behavioral boosts.

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Extended abstract

Energy sufficiency and *energy efficiency* are two strategies that policy makers can promote in order to limit the consequences of climate change (1). When individuals limit energy services or adopt energy efficiency technologies to reduce their carbon footprint even in the absence of external incentives, they engage in a type of pro-environmental behaviours (2,3). This decision can be seen as a decision to cooperate in a social dilemma, of which individuals internalise the associated externalities (4,5).

Some individuals, like the energy poor, do not have the freedom to decide whether and how to engage in pro-environmental behaviours (10). On the one hand, the inequality in income underlying energy poverty prevents the energy poor from being able to afford to choose pro-environmental strategies, like the adoption of energy efficient technologies (11). On the other hand, income scarcity might force the energy poor into less polluting energy behaviours, since they have to restrain the quality and quantity of energy services to afford other basic needs (12). This *energy limiting behaviour* cannot be considered as a first-best pro-environmental strategy that has been chosen, but is a symptom that basic energy needs are not met and that solutions would be required (13).

Tackling energy poverty has recently become a specific policy priority in Europe. Up to date, Member States have taken several measures, including (i) information measures; (ii) consumer protection measures; (iii) energy efficiency programs; and (iv) financial interventions (14). Energy efficiency programs tackle the structural cause of energy poverty, i.e. energy inefficient dwellings, by offsetting capital costs of energy efficiency measures, such as insulation ones (15). However, as these measures reduce the price of the relevant energy service, it is likely that individuals might increase their energy

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consumption following the measure implementation, thus offsetting the expected GHG reduction due to the energy efficiency of the measure (i.e. rebound effects, (16)).

Financial interventions address mainly the cost of energy rather than the structural causes of energy poverty, by providing social tariffs levied on energy bills or basic energy appliances (17). As these interventions are associated with an increase in income (i.e. income effects), individuals might increase their consumption over energy services or start consuming previously unaffordable energy services, which are associated with GHG emissions (18). These interventions are key to addressing the challenge of energy poverty by improving living standards; therefore, the potential for rebound and income effects on overall emissions should not be used as an excuse not to implement them (19).

A way to improve the efficacy of financial interventions (here intended as efficacy at addressing energy poverty mindful of the climate goals) could be tested, such as by introducing a behavioural economic tool that encourages citizens in meeting their energy needs in a pro-environmental way (20). However, the evidence on their role in the energy poverty context is still scarce (21,22).

Nudges and boosts are among the main behavioural economic tools available to policy-makers (23). So far, with the exception of (24) and (25), most of the available empirical evidence on the promotion of pro-environmental behaviours relates to nudges (26–29). The nudging approach, which has its roots in the dual system view of the human cognitive architecture (30), aims for a change in individual behaviour by adapting the choice architecture to people's cognitive and motivational processes (31). In contrast with nudges, proponents of boosts would empower individuals to learn how to autonomously cope with complex environments (32). In particular, the boosting approach aims to strengthen functional cognitive processes, by targeting individual competences, which can be specific to a domain or applicable across various domains (33). As an example, if individuals could become aware that when they take some decisions they also take decisions with consequences on others, they might learn that they are a collective agency and use strategies using a collective optimality criterion (34–37). In the energy poverty context, the application of a boost might be also more desirable than a nudge, since it enables to empower the energy poor's contextually-shaped agency (38). Empirical evidence on the effect of boosts on energy-relevant decisions is still scarce (22,24,25) and is lacking when looking at social dilemma competences.

In this study we present the results of a laboratory experiment conducted to shed light on two mechanisms (scarcity, boost) that are still not well understood in the literature, but also to potentially identify a mechanism (boost) upon which a policy could be based (39). In particular, we introduce a modified public bad game (40) and experimentally mimic a situation in which individuals have to choose through which option they can obtain energy services (i.e. cooling/heating needs), while producing negative externalities. Options are modelled to resemble the fact that a certain level of emissions depends both on the level of (costly) energy efficiency associated with the option providing the energy service (41), and the level of utility (comfort) that the individual is willing to give up when choosing how to meet a certain need (2). Therefore, individuals can engage in pro-environmental behaviours either by choosing an individually beneficial energy efficient, but more expensive, option, or an energy sufficiency, but overall less individually beneficial, ones. To account for the inequality in income that affects the energy poor's ability to choose freely among pro-environmental options, we study three different income groups. Then, we introduce a boost in the form of a simulation allowing individuals to become aware of the interdependence between their personal choices and the choices of others.

Preliminary results suggest that when income inequality is addressed through a financial intervention, individuals who have experienced income scarcity pollute more than individuals who have never experienced income scarcity. However, when the practice-based boost is introduced, this negative effect is reduced. In particular, we find that when income inequality is addressed through a combination of financial intervention and a practice-based boost, in the case of individuals with experience of income scarcity, they pollute less than those who do not receive the practice-based boost. The opposite is observed in the sample of people without experience with scarcity, for whom we observe an increase in the externality when the boost is used.

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