Social comparisons promote energy conservation among middle-income households in arid tropical cities —Two experiments in the Yucatan Peninsula

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Abstract

An increasing number of studies have documented the impact of "social comparisons" as nudges to reduce residential energy consumption. Yet, few studies are focused on the effect of nudges on developing or middle-income countries despite the prominent role that developing economies are expected to play in the combat against climate change.

The importance of non-pricing mechanisms, such as social comparison, to reduce energy consumption in developing countries has at least three sources. First, as temperatures rise, emerging economies happen to be located in zones where the temperatures will be higher than anywhere else on the Planet. Higher temperatures will increase the use of air conditioning and other appliances. Second, emerging economies will experience a jump in income that will eventually allow households to buy AC (and other electric devices). Higher-income is positively correlated with more electricity consumption (Lane, 2020). Third, non-price interventions are likely to succeed in an environment where populist governments are reluctant or unable to use pricing instruments.

This paper examines the effect of social comparisons in middle-income households in Southeast Mexico. We find that treatment of social comparison reduces electric consumption by 10% in Cancun and by 24% in Merida. Cancun and Merida are two of the fastest-growing cities in the Region, where the median annual income is close to 9,300 USD. We collected 302 observations in Merida and 275 observations in Cancun.

We randomly assigned treatment to about half of the sample. The treatment was a social comparison message in the form of a pamphlet with some tips to save energy and a comparison with the neighborhood consumption. All the variables were statistically identical between treated and non-treated groups. The variation thus can be attributed to the treatment. The response was higher in Merida than in Cancun. Also the Merida sample had a higher income and more appliances than the Cancun sample (9,300 vs. 7,250 USD). Also, Households with air conditioning had a significant response to the nudge.

Our results are comparable to findings in the literature, similar to the 29% decrease in the Netherlands staats2004effecting or the 21% decrease in electric consumption among Columbia University students (Peschiera et al., 2010). Still, other studies have results on the -1.7% in Allcott & Rogers (2014) or the -2.7% range in (Ferraro & Price, 2013).

One explanation for the strong response observed in Mexico could be the behavioral change among air conditioning users. According to Davis et al. (2020) and Estrella Guillen et al. (2021), the behavior of house dwellers influences the energy required to cool houses. One of the main arguments is that closing windows and doors allows the inside room with AC to cool more efficiently. It has been documented that in Mexico, people open windows, thus, eliminating the effect of insulation or AC Davis et al. (2020). If the treatment nudges residents to close windows and doors, this might explain a 24% reduction in energy consumption in some treated households. Another important feature is that our study documents the response in the immediate next period to the nudge. As Ferraro & Price (2013) find, the effectiveness of social comparisons wanes over time.

Using the conservative 10% reduction in energy consumption, If Mexico were to give nudges in residential households, and we assume an average residential annual consumption similar to the one in 2018: 1,987kWh of Environment (2018) and we consider 35.2 million households according to 2020 census, then a 10% reduction on electricity consumption is equivalent to 6,994 million kWh or 6.9 million MWh. If we use the emission factor of 0.454 tons of CO2-eq/MWh, then we would be saving 3.13 million tons of CO_2. If we consider only those households with air conditioning, which are 21% of all households, then this inexpensive and non-pricing mechanism would result in the elimination of 0.65 million tons of CO_2.

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