When the Chips are Down: An Incentivized Analysis of Preferences for Green Electricity in Switzerland

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Overview

Increased reliance on renewable energies is an important cornerstone of Switzerland's Energy Strategy 2050. However, the required fundamental change in the power supply does not come for free and, in the long run, sustainable change can only be achieved if it is broadly in line with consumer preferences, especially if the household electricity market is indeed going to be liberalized in the near future. In recent years, consumers seem to have become more willing to bear some of the additional costs of a sustainable energy supply. Nevertheless, relatively little is known about consumers' exact willingness to pay (WTP) for renewable energy. For the most part, studies investigating consumer preferences for different forms of renewable energy are based on unincentivized stated preferences (using either choice experiments or contingent valuation techniques) or provide only qualitative approximations (e.g., Spreng et al., 2001; Borchers et al., 2007; Burkhalter et al., 2009; Scarpa et al., 2010; Kaenzig et al., 2013). However, in order to ensure an efficient electricity mix oriented towards true customer preferences, it is essential to obtain accurate knowledge in this regard. For this reason, this paper aims to provide a more precise, quantitative estimate of WTP for different renewable energy sources than previous studies.

Methods

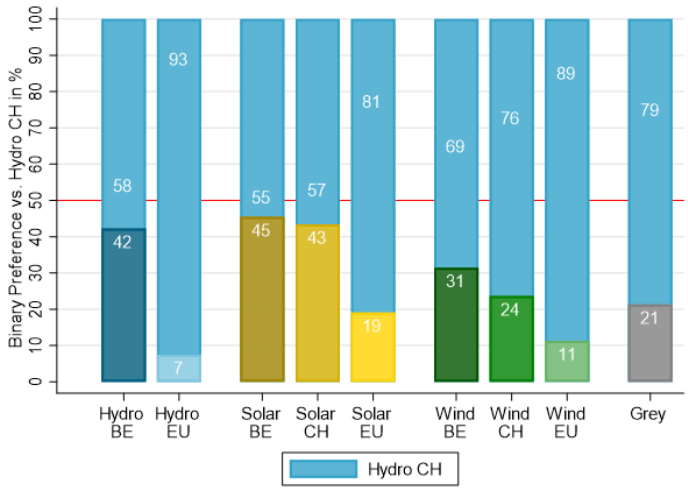
Our study reports on incentivized preferences for different forms of green electricity. To do so, we invited existing household customers of a large Swiss electricity utility to take part in a decision experiment in which participants could win 500 kWh of electricity and could choose between different sources of production for this electricity package. The experiment is based on a modified, two-stage Holt-Laury mechanism (Holt & Laury, 2002) to determine participants' willingness to pay for electricity from different forms of production (hydro, solar, wind, and nuclear) and with different attributes (regional, national, foreign). The preference elicitation mechanism applied in the experiment is incentive compatible, i.e. the participants had an incentive to disclose their true willingness to pay for the electricity in question in the experiment and could not gain an advantage by giving a distorted or deliberately false price (see also Marcin & Nicklisch, 2017). Importantly, our methodology limits the impact of socially desirable answers, which may be problematic in the context of pro-environmental behavior or attitudes such as the willingness to pay for renewable electricity (e.g., Vesely & Klöckner, 2020). Participants revealed their willingness to pay by choosing between electricity packages based on different renewable and non-renewable sources in a repeated choice list experiment (see Figure 1 for the wind example). In all decisions, Swiss hydropower was always one of the two options. As mentioned we payed special attention to the production location of the green electricity (e.g., whether the national or even regional origin of the energy source matter for the willingness to pay). For the regional choice we specified a power plant in the canton of Bern (BE).

Block	Option A	Option B
1	Hydro CH (Energy Blue)	Hydro BE (Aarberg)
2	Hydro CH (Energy Blue)	Hydro EU
3	Hydro CH (Energy Blue)	Wind BE (Juvent)
4	Hydro CH (Energy Blue)	Wind CH
5	Hydro CH (Energy Blue)	Wind EU
6	Hydro CH (Energy Blue)	Grey (Energy Grey)

Results

Our results based on responses from 6,482 participating households indicate that, on average, our participants had the highest willingness to pay for hydro and solar power. Wind power was associated with a substantially lower willingness to pay. As expected, the lowest willingness to pay exists for nuclear power. The figure 2 shows for all other electricity sources (see labels on the horizontal axis) the percentage of participants who chose Swiss hydropower (upper part of the bar) or the alternative electricity source (lower part of the bar).

Figure 2: Results of binary choice between the electricity package



While there is a certain segment of pro-environmentally minded consumers that is willing to pay a price premium for solar compared to hydro power, this is not the case for wind. In terms of origin of the produced electricity, for all renewable production technologies included in the study (hydro, solar, and wind) we observe a markedly lower willingness to pay for electricity stemming from European sources compared to Swiss sources. In contrast, we do not find meaningful differences in participants' willingness to pay for different production locations within Switzerland, i.e., there is no additional positive willingness to pay for a regional origin of the energy production compared to national origin. In terms of individual-level predictors of the willingness to pay for renewable energy, we find that political attitudes are one of the most important variables.

Conclusions

In sum, our results show that there are significant differences in household consumers' willingness to pay for different forms of renewable energy. These results can potentially inform investment and pricing decisions in the electricity market and provide relevant information for the design of a more sustainable electricity mix that is in line with customer preferences.

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