

# *10th International Conference of Panel Data Users in Switzerland*

## *Workshop 1B (room 2208) – Households' energy demand*

### **Title**

*Determinants of electricity consumption in Swiss homes*

### **Authors**

*Sylvain Weber, University of Neuchâtel (Institute of economic research)*

*Selin Yilmaz, University of Geneva (Institute for Environmental Sciences)*

*Mehdi Farsi, University of Neuchâtel (Institute of economic research)*

*Martin Patel, University of Geneva (Institute for Environmental Sciences)*

### **Abstract**

The implementation of energy efficiency measures is considered as key strategy for reducing non-renewable energy consumption and CO<sub>2</sub> emissions in Switzerland and globally. Residential sector indeed represents a substantial percentage of many countries final electricity consumption (more than 30% in Switzerland) and electricity consumption for home appliances is moreover expected to continue growing. It therefore appears important to understand what drives electricity consumption to support decisions on how to reduce the electricity demand and address the continuously increasing electricity consumption due to appliances to achieve the targets set on CO<sub>2</sub> emission reduction. The objectives of this work are twofold. First, we contribute to current knowledge and understanding of the effects of socio-economic factors, appliance ownership, and appliance use on electricity consumption in households. Second, we make data-related and methodologically-oriented contributions to identify the key determinants of electricity consumption in the households. The empirical investigation is based on the Swiss Household Energy Demand Survey (SHEDS), which provides longitudinal data (over 2016-2018), in particular concerning electricity consumption, and appliance ownership and their usage. Our analysis relies on longitudinal data, which have the advantage that they facilitate the identification of causal links between different factors and allow analysts to use panel econometric techniques that control for unobserved or unobservable heterogeneity. Moreover, we propose a methodology to deal with self-reported data (including in particular electricity consumption), which could help researchers who cannot always rely on meter readings. We create classes of households by means of a finite mixture model (FMM) to overcome the issues related to noise and inaccurate responses. The FMM provides a classification of households into low/medium/high consuming groups without imposing arbitrary cut-off levels in the distribution or deciding the number of groups ex-ante. Groups' composition can then be explained using multinomial response models. This method can help other researchers who have only self-reported electricity consumption, assuming that high consumers can be distinguished from medium and low consumers but that the differences are fuzzy within classes.