**Abstract**

Does household electricity consumption respond only to the existence of peak-demand-hour price increases rather than to the magnitude of their marginal changes under Time-Of-Use (TOU) electricity pricing? The answer is yes if different types of electricity consumption are not taken into account separately. In this paper, I re-examine the impact of TOU rates on residential electricity consumption with a different approach. Specifically, I decompose household electricity consumption into two different channels of consumption: consumption for non-temperature-control and temperature-control uses. I determine TOU-price-induced changes in both channels of consumption by applying Difference-In-Differences-style (DID-style) spline regression specifications using 30-minute interval metering data collected from an experiment in Ireland. My empirical results demonstrate that residential consumers are in fact quite sensitive to incremental changes in the peak-demand-hour price under the TOU tariff structure. However, this sensitivity is masked due to the opposite directional changes in the two channels of electricity consumption – i.e. peak non-temperature control consumption falls as the peak price increases while temperature control consumption during the peak hours actually increases slightly as the peak price grows. Moreover, my analysis reveals that the two channels of household electricity consumption evolve differently, and nonlinearly, according to daily heating degree days and the point electricity is consumed in time. Those multidimensional dynamics of residential electricity consumption under TOU tariffs suggest that adopting autonomous heating control systems or augmenting additional across-day variations to the price scheme is required to maximize the benefits of TOU electricity pricing.