

Price and income elasticity of residential and industrial electricity demand in the European Union

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Abstract

This study examines the price and income elasticity of residential and industrial electricity demand in the European Union between 1990-2015, and the effect of market liberalization on price elasticities. Precise and up-to-date price and income elasticity estimates are not only crucially important to enable electricity demand forecasting and subsequent grid infrastructure investment planning, but they also serve as an indispensable tool in modeling the effects of energy and climate taxes on households and industry (Burke and Abayasekara, 2017; Wang and Mori, 2017; Labandeira et al. 2017).

The European Commission (2014) views energy price increases as clearly concerning, as higher energy prices reduce the EU's global competitiveness globally, and impose additional financial burden on households and industry. Not only did the prices of energy commodities increase in the past decades, but the EU has also continued to increase its energy import dependence. Despite of the significance of the topic, most existing studies that estimate the price and income elasticity of electricity use in the EU deal with a limited geographical or sectoral scope. To the knowledge of the author, this is the first study examining short- and long-run elasticities for the whole of the EU over the past 25 years.

I employ between and cross sectional regressions to estimate the long-run price and income elasticity of residential and industrial demand, similarly to Burke and Abayasekara (2017) and Burke and Csereklyei (2016). These approaches are robust to the presence of unit root processes or autoregression on the one hand, and assume the presence of a long-run equilibrium on the other hand. To deal with the infamous simultaneity problem inherent in price-demand relationships, I use an instrumental variable approach. Short-run elasticities are estimated by first differenced equations.

The results suggest that industrial electricity usage is much more responsive to changes in prices and income, with long-run price elasticities found between -0.75 and -1.01, and income elasticities ranging between 0.76 and 1.08. The price elasticity of EU-wide household electricity usage is lower, between -0.44 and -0.67. Both the price and income elasticity are however considerably higher in case of new member states, indicating a potential social affordability concern. We find that both elasticities have been reducing over time in case of industrial customers, while the evidence is inconclusive for households. Short-run, year-to-year price elasticities for households are found around -0.05, and for industry between -0.08 and -0.1.