Do households respond to short-run electricity price changes?

Evidence from the Spanish Electricity Market

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A central issue in renewable-dominated electricity systems is how to ensure that electricity demand is met at all times, even when renewable resources are scarce. The traditional solution has been to overbuild capacity, but this is costly as it requires investing in back-up plants which will rarely be used. In contrast, inducing consumers to change their consumption patterns through dynamic pricing incentives is increasingly viewed as an efficient way to help balance the system, reducing the need for excess production capacity. Dynamic pricing incentives will further become increasingly relevant as batteries become more broadly spread across households.

Dynamic pricing, also referred to as Real Time Pricing (RTP) has several potential benefits. **By providing an efficient price signal to consumers, consumers face the right incentives to change their consumption patterns in an efficient manner:** when the system is nearing its capacity limit (because demand is high and renewables are scarce), prices rise; and when there is excess capacity (because demand is high and renewables are abundant), prices fall. This should encourage consumers to shift consumption from high-priced hours to low-priced hours, thus reducing the costs of meeting our electricity needs. In the longer run, this should also reduce the amount of capacity needed to meet peak demand. But, do consumers respond to price changes in this way?

A policy intervention that took place in Spain provides a unique opportunity to answer this question. Since RTP was introduced as the default option for all households, most residential consumers now face a retail tariff that varies on an hourly basis according to the hourly changes in wholesale electricity prices., instead of paying a traditionally flat retail price No other country has ever implemented RTP as broadly.

Using this natural experiment, a recent paper analyzes consumers' response to short-run electricity price changes thanks to access to the smart meter hourly consumption data of more than 2 Million Spanish households. They find that those households exposed to RTP exhibit an average price elasticity of zero, a finding that is robust to alternative specification choices and falsification tests. There are several potential explanations for this finding: lack of consumer awareness, costly information acquisition, and small gains of demand response due to low price variation. These are not general condemnations of RTP as a useful policy tool, but rather inform what may be necessary conditions for RTP to be successful in other settings. Our results suggest that electricity demand response may require public campaigns to increase awareness, technology that lowers information acquisition and adjustment costs for the end-users, and/or steeper price gradients (between scarce and abundant hours) to induce measurable behavioural changes.

In future work, **the authors also explore the distributional implications of dynamic pricing, an issue that still todays remains largely unexplored.** ·

Further reading

Fabra, N., D. Rapson, M. Reguant, and J. Wang (2021) "Estimating the Elasticity to Real Time Pricing: Evidence from the Spanish Electricity Market", American Economic Association Papers & Proceedings, 111, 425-29.