

DYNAMIC PRICING, DEMAND RESPONSE, AND REGULATION IN ENERGY MARKETS: EVIDENCE FROM IRISH SMART METERING DATASET

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Overview

Demand response will play an important role in electricity market. In much of the current literature the focus has been on estimating demand response for a given set of prices. Among demand response programmes, the dynamic pricing schemes are believed to have the greatest potentials on shifting and reducing peak load, thus not only reducing the financial risks for electricity retailers, but also benefiting consumers. In this paper we consider a different problem, namely how should a retailer decide the dynamic prices to maximize profit, while guaranteeing welfare gains for consumers.

Methods

We develop a game theoretical model in a dynamic pricing environment with two types of decision makers: retailer and consumers. Working backward we first solve for demand for consumers for a given set of prices. We then solve the retailers problem, namely find the day-ahead prices that maximise profit, given the demand response of consumers. We utilise data from the Ireland Electricity Smart Metering Trials programme to evaluate the profit gain through switching from the existing flat tariff scheme to the proposed dynamic tariff scheme for both retailer and consumers.

Results and Conclusions

We find that consumer's elasticity of demand is much lower than the level where the retailer can maximise profit, hence the retailer is motivated to provide much clearer information on prices to encourage stronger demand response from consumers. We also find that tighter market regulation and allowing for differentiated and personalised tariffs would increase market surplus, which suggests policymakers to set tighter regulation rules on the retail market.