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**TIME-OF-USE PRICING AND ELECTRICITY DEMAND RESPONSE:
EVIDENCE FROM A SAMPLE OF ITALIAN INDUSTRIAL
CUSTOMERS**

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Overview

Time-varying retail pricing schemes, by giving incentive to demand reductions during peak hours, may enhance the efficiency of the electricity market for (at least) three theoretical reasons: a) both short run and long run marginal cost are typically higher during peak hours; b) congestion problems are more likely to arise at peak; c) market power abuse is favoured in the presence of low demand elasticity in the wholesale market. However, the success of this type of pricing policies crucially depend on the demand elasticity measured at the final customer level; in particular, it depends on the willingness to shift part of the consumption across time.

In this paper, price responsive behaviour has been measured on a sample of medium sized industrial consumers facing Time-of-Use (TOU) schemes between 2000 and 2003, using data concerning the dynamic of the TOU tariff and exploiting also the variability of the pricing schemes across different typologies of users.

Methods

The econometric analysis uses monthly data on firm consumption, disaggregated according to the different pricing period. The model involves the estimation of a nested Constant Elasticity of Substitution (CES) input demand function, which allows estimating substitutability of electricity usage across different hourly intervals within a month and across different months. Elasticities were measured both on aggregate and individual data.

Results

The results highlight a certain degree of substitutability among the different pricing periods; in particular substitutability across months (on average, elasticity of substitution was measured as equal to 0.20) seems to be easier than substitutability across different hourly intervals within a month (elasticity of substitution equal to 0.11). However, the customer response was proved to be widely heterogeneous in the sample, and in particular among different activity sectors.

Conclusions

Traditionally, TOU pricing has been merely cost-based, while it should attempt to predict the effects on load variations induced through the value of the elasticity of substitution. This paper shows an example of how these value, once estimated, can be used to formulate optimal TOU given a desired (and feasible) modification on load profile. Moreover, it shows how these values can be the basis for price discrimination strategies in a (fully) liberalised retail market.

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