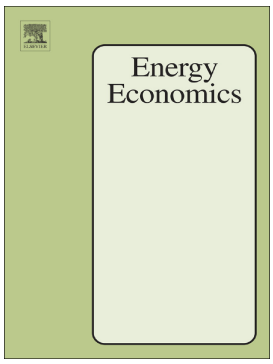

Which smart electricity service contracts will consumers accept? The demand for compensation in a platform market

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Which smart electricity service contracts will consumers accept? The demand for compensation in a platform market

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Abstract

This paper analyses the heterogeneity of household consumer preferences for electricity service contracts in a smart grid context. Platform pricing strategies that could incentivise consumers to participate in a two-sided electricity platform market are discussed. The research is based on original data from a discrete choice experiment on electricity service contracts that was conducted with 1,892 electricity consumers in Great Britain in 2015. We estimate a flexible mixed logit model in willingness to pay space and exploit the results in posterior analysis. The findings suggest that while consumers are willing to pay for technical support services, they are likely to demand significant compensation to share their usage and personally identifying data and to participate in automated demand response programs involving remote monitoring and control of electricity usage. Cross-subsidisation of consumers combining appropriate participation payments with sharing of bill savings could incentivise participation of the number of consumers required to provide the optimal level of demand response. We also examine the preference heterogeneity to suggest how, by targeting customers with specific characteristics, smart electricity service providers could significantly reduce their customer acquisition costs.

Keywords: smart energy services, preference heterogeneity, platform markets, consumer choice, posterior analysis, willingness-to-pay

1. Introduction

In line with many other countries attempting to reduce carbon emissions and increase the use of renewable energy, the UK government aims to integrate large quantities of intermittent wind and solar into the electricity grid. Such renewable energy resources result in variable electricity supply that must be matched with flexible demand. The challenge is to improve monitoring and control of generation, storage, transmission, distribution and consumption of electricity such that supply and demand can be matched in real time [4]. One way to achieve real-time matching of demand and supply is via demand-side management (DSM), i.e. via intentional modifications of electricity consumption patterns to alter the timing, level of instantaneous demand, or total electricity consumption [2].[1] DSM can be facilitated by the integration of the electricity grid with information and communication technology (ICT) as part of so-called 'smart grids'.

Residential consumers have particular potential for smart technologies, smart contractual arrangements and DSM to facilitate the balancing of supply and demand in real time, since the domestic sector makes up a large share of total electricity consumption.[2] A 'smart' home incorporates a communication network that connects the key electrical appliances and allows them to be remotely controlled, monitored or accessed [9]. In this context, 'smart' refers to the connection and communication of different electrical devices in the home via the internet.

Smart home devices need to be distinguished from smart energy services that emerge with the devices: smart home devices range from smart electricity meters and smart household appliances to integrated solar photovoltaic panels and electric vehicles that both smartly consume and deliver electricity. The combination of these devices, the data they provide and the control actions they enable facilitate

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[1] There are two main types of demand-side management (DSM) actions: firstly, load interruption for short periods with minimal impact on consumer comfort. This can provide frequency response energy services and is usually considered for appliances that continuously use power (e.g. fridges and freezers). Secondly, demand shifting of appliances that operate in limited duration cycles. This can provide standing reserve and balancing energy services and is usually considered for appliances that consume electricity during a fixed duration cycle (e.g. washing machines and tumble dryers).

[2] In the UK households consume around 30 per cent of the total electricity consumed across the year and up to 45 per cent at peak times of the day.