



Willingness to pay for residential electricity supply quality and reliability



David A. Hensher^{a,*}, Nina Shore^b, Kenneth Train^c

^a The Business School, The University of Sydney, NSW 2006, Australia

^b NERA Economic Consulting, London, United Kingdom

^c Department of Economics, University of California, Berkeley, United States

HIGHLIGHTS

- Identifying WTP to avoid specific restrictions on service supply quality in residential electricity.
- Stated choice experiments are developed to reveal the set of preferences required to calculate WTP.
- Empirical setting is a sample of residents in Canberra, Australia.
- Frequency and the duration of outages are important to customers.
- Customers value incurring fewer shorter outages, compared to more frequent longer outages.

ARTICLE INFO

Article history:

Received 28 April 2012

Received in revised form 15 September 2013

Accepted 3 November 2013

Available online 30 November 2013

Keywords:

Willingness to pay
Residential electricity
Service quality
Reliability
Choice analysis

ABSTRACT

A key feature of many regulatory reviews is determination of the amount of expenditure that should be reflected in the revenue requirement for a service provider. An increasingly important driver in determining the appropriate level of this expenditure is the desired level of service quality and requisite service targets which are incorporated in the 'regulatory bargain'. Willingness to pay (WTP) evidence can be used in the regulatory bargain to establish such targets. In this paper we study households' WTP to avoid specific restrictions on service supply quality (especially reliability) in residential electricity, using stated choice experiments to reveal the set of preferences required to calculate WTP. Using a sample of residents in Canberra, Australia, we find that residential customers value reliability of the electricity service; in particular, frequency and the duration of outages are important to customers, and customers value incurring fewer and shorter outages, compared to more frequent and longer outages. The average WTP to avoid a common set of events such as outages, power surges and flickers in electric current vary from \$60 per customer per event for an 8-h electricity outage when it occurs once a year through to \$9 per event for a flicker in electric current.

© 2013 Elsevier Ltd. All rights reserved.

1. Introduction

The price of electricity in many jurisdictions is regulated by an independent competition and regulatory commission under an "incentive regulation" regime. Such regimes are designed to provide a financial incentive for businesses to reduce costs, with any cost savings being initially kept by the businesses and then, over time, passed onto customers in the form of lower prices. In the absence of regulatory oversight of the quality of service supplied to customers, such a regime can create inappropriate financial incentives for businesses to reduce costs at the expense of the quality of service provided.

The regulatory regime, if properly structured, should provide a framework that will encourage businesses to provide an efficient mix of both quality of service and price to the customer. There are at least three ways in which service quality enters the regulatory framework:

1. via the level of service quality which is assumed to underlie the revenue requirement established for the regulated business at the time of each price review;
2. via explicit performance incentive schemes which reward improvements in the average level of service quality over and above these targets, and/or penalise a business's failure to meet the service targets embodied in the revenue requirements; and
3. through establishing guaranteed service levels for specific aspects of service quality experienced by individual customers (or some larger sub-set of the total customer base).

* Corresponding author. Tel.: +61 2 91141824; fax: +61 2 91141722.

E-mail addresses: david.hensher@sydney.edu.au (D.A. Hensher), Nina.Shore@nera.com (N. Shore), Kenneth.Train@NERA.com (K. Train).

In many countries, regulators are implementing, or considering the development of a service incentive scheme to be incorporated as part of the price control applying to the utilities they regulate, including the role and form of the minimum standards that should be applied to these utilities. A key part of many regulatory reviews is the determination of the amount of operating, maintenance and capital expenditure that should be reflected in the revenue requirement for a service provider. An increasingly important driver in determining the appropriate level of this expenditure is the desired level of service quality and requisite service targets which are incorporated in the 'regulatory bargain'.

Regulatory decisions need to be made as to the appropriate balance between improved levels of service quality (e.g., a reduction in system minutes off electricity supply) and the impact on customer prices, since improved quality will in the majority of cases require a higher level of expenditure. The difficulty for a regulator and the service provider in putting forward their expenditure proposals is to know the extent to which customers are willing to pay higher prices to experience improvements in quality and which aspects of service quality customers would most like to see improved. The willingness to pay (WTP) is defined as the amount of money a household is willing to pay for a specific level of service; for example in order to reduce the number and duration of outages from a base level (e.g., 4 outages per year of 30 min each) to another level such as 2 outages per year for the same duration.

A willingness-to-pay study can provide evidence that the service provider can put before a regulator to support expenditure plans, by highlighting which aspects of service quality are important to customers and, importantly, estimating the value customers place on various service attributes. The estimated willingness to pay can then be compared with the incremental costs of achieving such improvements, as part of the service provider's business planning and the regulator's decision-making process. Customers' willingness to pay provides an 'upper-bound' on the financial incentive or reimbursement that should be associated with service improvements. The 'lower-bound' is represented by the incremental cost to the business of improving that aspect of service quality.

In this paper we discuss ways in which service quality can be incorporated in the regulatory regime, report the results of a stated preference study of Canberra households' willingness to pay to avoid a range of electricity supply restrictions; and highlight the ways in which the WTP evidence can be used in the context of each regulatory framework. The selection of a stated preference experiment to empirically identify estimates of WTP is in line with what is generally regarded as state of the art and state of practice methods to study individual's preferences for alternative packages of attributes that describe products and services. Details of such methods are set out in the well known text by Louviere et al. on this topic [1].

2. An overview of other studies

There is a small but growing literature of studies that have focused on identifying the attributes that define the quality of service provided by an electricity supplier. Product attributes typically adopted in other stated preference studies for electricity, include:

- frequency and duration of service interruptions (including momentary/transient interruptions);
- voltage consistency;
- notification timing and method prior to a planned interruption;
- making and keeping appointments with customers;
- advising customers of compensation payments;
- time taken to answer the telephone at the customer call centre;
- meter reading frequency;

- time taken to connect new customers;
- response time to customer queries;
- response time to emergency events;
- repair of street lights; and
- provision of back-up supplies in the event of an emergency/extended interruption.

In 2001, the US Office of Gas and Electricity Markets commissioned research (MORI 2002) [2] with the aim of establishing whether the introduction of competition into the electricity and gas markets had been successful. 2238 face-to-face interviews were undertaken with customers. The key findings suggested that 'restoring power' and 'advising of impending power failures' were the most important service features; respondents were relatively insensitive to the *number* of power cuts; keeping appointments, advising customers of compensation payments and answering the telephone quickly and efficiently were identified as important standards; annual meter readings were preferred to quarterly readings; responding quickly to prepay meter faults is important, although mostly to those who pay by prepayment meter; when disruptions occur the priority for customers is a quick response to rectify the problem, followed by the provision of good, clear information at the time, and being able to get through easily on the phone; the majority of customers favoured retaining the concept of minimum standards of performance. When offered the choice of a reduction in price and abolishing minimum standards or retaining the minimum standards, the majority again preferred the latter. Those who favoured a price reduction thought that an average reduction of 29% in price would be appropriate. When asked how *resources* should be directed regarding the issue of power cuts, most respondents identified reducing the duration of power cuts as the first priority. The frequency with which they happen was the second most important objective, followed by responding to questions during a power cut.

In an attempt to provide guidance to regulators, and to assist retailers in designing service packages, Goett et al. [3] undertook a study on consumers' willingness to pay for various service attributes.¹ Consumers were first approached by phone. Those that agreed to participate were then sent a package of materials, including a series of choice experiments. Each experiment consisted of four options. The respondents were then contacted a second time by phone and asked to choose one option for each experiment. Each customer was faced with a total of 20 choice experiments. The experiments were designed so that each question was as specific as possible, for example "two short outages per year of 30 s each". Two of the attributes examined in the experiments are of particular relevance to the network service. These are reliability and quality of supply. The reliability options were:

- two short outages per year of 30 s each;
- four short outages per year of 30 s each;
- two outages per year of 30 min each; and
- four outages per year of 30 min each.

The study indicated that customers were willing to pay to reduce the number and duration of outages. Respondents were willing to pay, on average 1.21 cents per kW h to reduce outages from the base level (4 outages per year of 30 min each) to 2 outages per year for the same duration; 0.65 cents to reduce outages from 2, 30-min outages to 4, 30-s outages; and 0.91 cents to reduce outages to 2, 30-s outages. The Power Fluctuations (Power Quality Guarantee) options consisted of:

¹ Carlsson and Martinsson [4], and Abdullah and Mariel [5] both use the same methods as used in this paper, citing the methodological contributions of Hensher and Train (noting that our research was undertaken much earlier than these papers).

Download English Version:

<https://daneshyari.com/en/article/6691357>

Download Persian Version:

<https://daneshyari.com/article/6691357>

[Daneshyari.com](https://daneshyari.com)