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Investigating household preferences for kerbside recycling services in London: A choice experiment approach ☆

Katia Karousakis[a,1], Ekin Birol[b,*]

[a]Economics Department, University College London, London WC1E 6BT, UK
[b]Department of Land Economy, Homerton College, University of Cambridge, Hills Road, Cambridge CB2 2PH, UK

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Abstract

Recent developments in national and European Union waste management policy have prompted considerable interest in alternative waste management programs, such as recycling, which could divert a portion of the municipal solid waste stream from landfills. This paper examines household preferences for kerbside recycling services and uses a stated preference choice experiment method to estimate households' valuation of such services. Using a sample of 188 households in the London area, the empirical analysis yields estimates of the willingness to pay for the number of 'dry' materials collected, the collection of compost, textile collection and the frequency of collection.
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1. Introduction

Recent developments in national and European union (EU) waste management policy have prompted considerable interest in alternative waste management programs that would divert a portion of the municipal solid waste (MSW) stream from landfills. This is particularly relevant in certain European countries that have recently become signatories to the European Commission (EC) Landfill Directive (1999/31/EC)[2] and are far from attaining their targets. A prime example of this is the United Kingdom (UK), which has one of the poorest records in Europe with regard to the proportion of MSW that is sent to landfills (Eurostat, 2003). This is in the order of 80%, though it is expected to decrease in the future as a result of government policy, including the landfill tax and the requirement that 25% of MSW be recycled.[3]

The EC Landfill Directive sets targets for the UK to reduce the landfilling of biodegradable municipal waste to 75% of 1995 levels by 2010, 50% by 2013 and 35% by 2020. Failure to meet the targets of the Directive implies that the UK could face a non-compliance fine of up to £500,000 per day after the first target date in 2010. Furthermore, the government has reserved the right to pass on any EC fine imposed on the UK for missing the Landfill Directive targets onto the local authorities or devolved administrations responsible. This could mean that failing councils would be responsible for their share of

Abbreviations: EU, European Union; UK, United Kingdom; MSW, municipal solid waste; EC, European Commission; CE, choice experiment; WTP, willingness to pay; CV, contingent valuation; CLM, conditional logit model; IIA, independence of irrelevant alternatives; ECI, environmental concern index; RCI, recycling constraint index; RMI, recycling motivation index

☆The views stated in the paper do not necessarily reflect those of the OECD or of its member countries.

*Corresponding author. Fax: +44 1223 507206.
E-mail addresses: katia.karousakis@oecd.org (K. Karousakis), eb337@cam.ac.uk (E. Birol).
[1]Present address: OECD, Environment Directorate, Paris, France.
[2]Official Journal L 182, 16/07/1999, 0001–0019.

[3]The 1990 White paper "This Common Inheritance" sets out government intention to achieve this target by the year 2000 (HMSO, 1990). Government national recycling targets for England are: 17% recycling or composting by 2003–2004; 25% recycling or composting by 2005; 30% recycling or composting by 2010 and 33% recycling or composting by 2015.

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fines reaching £180 million a year until the Directive's demands are met.[4]

This paper employs a stated preference choice experiment (CE) method to estimate households' valuation, via their willingness to pay (WTP), for kerbside waste separation and collection services in London. The purpose of the study is to examine the determinants of household recycling behaviour and to estimate the recycling service attributes that are valued most highly by the public. The recycling service attributes valued are the kerbside recycling of a number of 'dry materials' (paper, glass, aluminium, plastic and textiles), in addition to composting of garden and food waste and the frequency of kerbside collection. Facing budget constraints and strict recycling targets, this information could help local authorities to prioritise the recycling services and facilities they offer to their residents.

The contribution of this study to the literature is threefold. Firstly, though several studies have employed stated preference methods (e.g., the contingent valuation and contingent ranking methods) to estimate the economic value of recycling (see, e.g., Jakus et al., 1996; Lake et al., 1996; Tiller et al., 1997; Huhtala, 1999; Kinnaman, 2000; Caplan et al., 2002; Aadland and Caplan, 2003), there is to date only one example of a CE study on recycling (see Jin et al., 2006).[5] The CE presented in this paper is the first such study applied to estimation of the WTP for the kerbside collection of dry materials, compost and textiles. Secondly, there is only one study that examines recycling behaviour in London (Robinson and Read, 2005). Consequently, there is an urgent need for information on recycling costs and benefits in London so as to develop efficient and effective recycling services. Finally, studies on composting are limited to Sterner and Bartelings (1999) who study *inter alia* the determinants of composting in a small Swedish municipality, and Kipperberg (2003) who examines composting of yard and food waste in Seattle. Since around 40% of household waste could be composted, this is an important part of the waste stream, which should be studied in greater detail.[6] Moreover, the collection of compost is a relatively new feature of waste services provided in London (recently introduced in the borough Richmond-upon-Thames in November 2005). This study therefore represents a timely opportunity to estimate the economic value of composting to households in London.

The paper is organised as follows: Section 2 presents the theory underlying the CE method. Section 3 discusses the design and administration of the CE survey, whose results are reported in Section 4. Section 5 concludes with policy implications.

2. The choice experiment method

The CE method has its theoretical grounding in Lancaster's model of consumer choice (Lancaster, 1966), and its econometric basis in random utility theory (Luce, 1959; McFadden, 1974). Lancaster proposed that consumers derive satisfaction not from goods themselves but from the attributes they provide. To illustrate the basic model behind the CE presented here, consider a respondent's choice for a kerbside recycling service and assume that utility depends on choices made from a set C, i.e., a choice set, which includes all the possible kerbside recycling service alternatives. The respondent is assumed to have a utility function of the form:

$$U_{ij} = V(Z_{ij}, S_i) + e_i, \tag{1}$$

where for any respondent i, a given level of utility is associated with any alternative kerbside recycling service j. Utility derived from any of the kerbside recycling service alternatives depends on the attributes (Z) of the service, such as the number of materials collected and frequency of collection, as well as the social, economic and attitudinal characteristics (S) of the respondent.

The random utility approach is the theoretical basis for integrating behaviour with economic valuation in the choice experiment. In this approach, the utility of a choice is comprised of a deterministic component (the first term on the right hand side of Eq. (1)) and an error component, e_i, which is independent of the deterministic part and follows a predetermined distribution. This error component implies that predictions cannot be made with certainty. Choices made between alternatives will be a function of the probability that the utility associated with a particular option (j) is higher than that associated with other alternatives. Assuming that the relationship between utility and characteristics is linear in the parameters and variables function, and that the error terms are identically and independently distributed with a Weibull distribution, the probability of any particular alternative j being chosen can be expressed in terms of a logistic distribution. Eq. (1) can be estimated with a conditional logit model (CLM) (McFadden, 1974; Greene, 1997, pp. 913–914; Maddala, 1999, p. 42), which takes the general form

$$P_{ij} = \frac{e^{V_{ij}}}{\sum_{h \in C} e^{V_{ih}}}. \tag{2}$$

Generally, the conditional indirect utility function estimated is

$$V_{ij} = \beta_1 Z_1 + \beta_2 Z_2 + \cdots + \beta_n Z_n + \beta_a I_1 + \beta_b I_2 + \cdots + \beta_m I_k, \tag{3}$$

where the number of kerbside recycling service attributes considered is n and the number of social, economic

[4] www.letsrecycle.com

[5] Garrod and Willis (1998) also employ this method to examine lost amenity due to landfill waste disposal.

[6] When organic waste is deposited at a landfill, biodegradation results in the generation and release of methane and carbon dioxide into the atmosphere, contributing to climate change. Estimates suggest that 6% of all methane emissions from the atmosphere occur from landfill sites (Beede and Bloom, 1995).

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