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The recreational value of gold coast beaches, Australia: An application of the travel cost method

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ABSTRACT

The Gold Coast beaches are among Australia's most popular beaches and rank among the world's best-known beaches. A good understanding of the characteristics of beach users and their recreational use values is of fundamental importance to formulate effective beach management policy. This paper, using the individual travel cost method, estimates the recreational use value of Gold Coast beaches. The value of a single beach visit is estimated to be $19.47 per person. Furthermore, the efficiency of the value transfer method is analysed in this study. To do this, the recreational value of Gold Coast beaches transferred from the relevant studies conducted for other Australian beaches is compared with this study.

1. Introduction

The tourism industry is an important part of the Australian economy, accounting for 2.6% of Australia's GDP and 4.5% of Australia's employment in 2009–2010 (Tourism Research Australia, 2011). Beach tourism is significant due to the extensive coastal areas in Australia and the associated beach and sunshine culture. The Gold Coast is the second most populated city in Queensland, Australia. Gold Coast beaches are famous around the world for their beauty and fine white sands. The 52 km of urban ocean beaches provides a unique environment for world-class surfing, swimming and relaxing. To ensure that the amenity and the great feature of these beaches is maintained, an effective beach management policy is required to restore or prevent the beaches from any erosion caused by high energy swell and storm events. However, recently, the Queensland State Government was considering not contributing any funds towards the Gold Coast beach protection projects with the argument that it was a local City Council issue. To assist in making policy decisions about whether and how much should be invested to protect the Gold Coast beaches, it is useful to understand the characteristics of beach users and their recreational use values. The value of Gold Coast beaches to local residents were estimated in 2008 (Blackwell et al., 2013). However, the value of Gold Coast beaches to non-local domestic and international tourists remains unknown.

This paper estimates the value of recreational visits to Gold Coast beaches using the travel cost method. The consumer surplus per person per visit from a Gold Coast recreational beach visit was analysed using data from the onsite questionnaire surveys. Travel cost, travel time, socio-economic variables (gender, age, education and income), substitute site variable and an environmental quality variable were considered in this study to explain beach visit frequencies. This paper contributes to the travel cost literature in two ways: first, given the heterogeneity of recreational sites, the appropriate coverage of travel cost measure needs to be customised and we thus experimented with different definitions of travel cost. In particular, for any a site with substantial longer stays, accommodation cost is important and should be considered in the analysis; second, we experimented with alternative income-related questions to obtain relevant information aiming to reduce the estimation bias and non-responses to the income question often observed in travel cost surveys (Riphahn and Serfling, 2005). We also make a contribution to the value transfer literature by comparing the transferred value of recreational beach visits from

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available Australian studies to Gold Coast beaches. The validation and transferability of unit value transfer and benefit function transfer are examined.

2. Method

2.1. Travel cost method

The Travel Cost Method (TCM) was used here to estimate the value of the recreational activities because recreational sites, such as natural reserve parks and beaches, and recreational activities are not traded in markets and therefore have no market prices. To estimate the value of goods or services that do not have market prices, non-market valuation methods are normally used, such as: the contingent valuation method; the travel cost method; the hedonic price modelling; and the choice modelling (Lipton et al., 1995; Nunes and van den Bergh, 2001).

TCM is one of the most popular methods for estimating recreational values. It aims to convert the physical and social benefits produced by outdoor recreation into monetary terms (Ward and Beal, 2000). It was first suggested by Hotelling in 1947, and has since been improved and applied frequently (Kolstad, 2010). The Zonal Travel Cost Method (ZTCM) and the Individual Travel Cost Method (ITCM) are two forms of travel cost methods (Willis and Garrod, 1991). ZTCM was developed by Clawson and Knetsch in the 1960s (Clawson and Knetsch, 1966). A simplified description of ZTCM is that it evaluates the recreational benefit in a particular area (zone) by multiplying the average cost of a visit to that area by the total number of visits (Anning, 2012). However, the different characteristics of individual visitors affect travel expenditure, so that the aggregated and averaged ZTCM can be inaccurate (Ward and Beal, 2000). ITCM, developed by Brown and Nawas (1973) and Gum and Martin (1975), is based on individual visitors, and considers both the travel cost and social-economic characteristics of each individual. ITCM has an advantage in analysing those sites that have high visitor numbers (Bennett, 1996; Asafu-Adjaye, 2005; Rolfe and Dyack, 2011). For these reasons, ITCM was selected for this study.

The basic theory behind the travel cost method in valuing non-market goods, especially recreational sites and recreational activities, is that the travel cost is the implicit price visitors pay for their trip to access sites or to be able to take part in particular activities (Becker et al., 2005; Phaneuf and Smith, 2005). Through analysing the relationship between the travel costs (price) in accessing a recreational beach site and the number of visits per year to this site (demand) for beach visitors, a demand curve relating the two can be found. Generally, the demand curve is decreasing, that is, the higher the cost, the fewer the visits. To determine the relationship, regression methods can be used.

A Poisson regression model is an appropriate model because of the count data characteristics of beach visits: the probability of a count is determined by a Poisson distribution (Long, 1997). Count models based on the Poisson distribution have the advantage of avoiding the regression bias caused by the fact that the dependent variable can only take non-negative integer values (Shaw, 1988; Dobbs, 1993). However, Poisson regression models suffer from overdispersion bias when the variance of the counts does not equal the mean (Long, 1997). A Negative Binomial regression model, which allows the variance to be greater than the mean (McCullagh and Nelder, 1989), is considered to be more suitable in the presence of overdispersion.

The expected value of the dependent variable in a Negative Binomial Regression can be written as Long and Freese (2006)

$$E(y|\mathbf{x}) = \exp(\boldsymbol{\beta}\cdot\mathbf{x}) = \exp(\beta_0+\beta_1x_1+\beta_2x_2+\ldots+\beta_ix_i). \quad (1)$$

β_i is the estimated negative binomial regression coefficient for the ith variable in the model and β_0 is a constant.

The dependent variable used in this analysis is the number of visits to the beach where the survey was conducted per person per year. Since non-users of the beaches are not included in this study, the Zero-Truncated Negative Binomial regression (ZTNB) is more suitable. ZTNB has the merit of overcoming the analysis bias caused by a truncated dependent variable (Creel and Loomis, 1990; Bowker and Leeworthy, 1998; Blackwell, 2003).

Four kinds of independent variables are included in the ITCM: travel costs, the socioeconomic characteristics of each beach visitor, substitute site variable and an environmental quality variable. Four different kinds of travel cost, as shown in Table 1, were considered in this analysis to test the sensitivity of the results.

The independent variables relating to socioeconomic characteristics included gender, education level, age, number in party, visitor type and household income. The effects of substitute site are included as a binary variable and coded as 1 if the interview site was the most frequently visited beach by the interviewee during last the 12 months, otherwise, coded as 0. The environmental quality variable was included in terms of the rating of the beach by the interviewee as a place to visit: answers were chosen in the range 0 (very poor) to 5 (about average) to the highest 10 (very good).

The net benefits for visitors using a recreational site can be measured as a Consumer Surplus (CS): the CS is the difference between the total amount that consumers are willing and able to pay for a good or service and the total amount that they actually pay. It is the most commonly used measure of visitor net benefits. Using Poisson regression or Negative Binomial regression, the consumer surplus per trip per person was estimated as the negative inverse of the coefficient of the travel-cost variable from the regression (Ward and Beal, 2000).

2.2. Data

Onsite questionnaire surveys were conducted at Gold Coast beaches by the first author and 3 other trained interviewers, from 19th to 28th November 2011 (late spring), mainly at Surfers Paradise Beach, Narrowneck Beach, Main Beach and Broadbeach. The surveys were conducted systematically from one side of the beach to the other in order to survey as many people on the beach as possible. One person was chosen randomly from each group;

Table 1
Description of travel cost variables included in TCM.

Variable	Description
MTC	Return vehicle running costs and cost of parking per person, **or** cost of return ticket on public transport
TTCMTC	MTC + travel-time cost
OEMTC	MTC + on-site expenditure
OETTCMTC	TTCMTC + on-site expenditure

MTC: minimum travel cost; TTC: travel-time cost; OE: on-site expenditure.