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The Non-Market Value of Water Based Activities
in the West of Ireland

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Abstract

Coastal locations are traditional hotspots for tourism and leisure activity. The economic growth experienced in Ireland since the mid 1990s, coupled with an increased focus on health, leisure and improved lifestyle has contributed to an increase in participation in marine water-based activities (WBA). This paper examines the demand for and value of WBA offered by companies in the West of Ireland. Using parameter estimates derived from a truncated negative binomial model travel cost model (TCM), this paper derives consumer surplus for WBA participants. The paper found that participants place a high value on commercial WBA located along the West coast of Ireland.

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1. Introduction

The coastal landscape of Ireland is among its best known scenic attributes (Cooper, 2009) and provides a host of activities for outdoor enthusiasts (Curtis, 2003). These activities range from coastal walks and angling to more active pursuits, such as diving and surfing. The economic growth experienced in Ireland since the early 1990s (O'Mahony et al., 2009), coupled with an increased focus on health, leisure and improved lifestyle (Ginty 2007; Atkins and Bowler, 2001) has contributed to a year-on-year increase in participant in marine water based activities (WBA) since 2000 (Failte Ireland, 2009). In 2008, 1.2 million of domestic and over-seas holidaymakers engaged in a WBA. In 2007, the Irish market for marine leisure generated €453.3 million in gross value added (GVA) to the Irish economy and employed 5,800 individuals (Morrissey et al., 2010).

Within the wider marine tourism sector, companies which provide WBA offer a multitude of marine based activities, including surfing, diving, sea-kayaking, wind-surfing, etc. In 2007, these companies contributed €40 million in GVA to the marine tourism sector and employed 1,090 individuals (Morrissey, 2010). However, less obvious than the economic benefits of leisure activity is the positive welfare effect individuals derive from recreational activities. Recreational activities have been found to help build social and familial infrastructures (Arai and Pedler, 1997), combat social exclusion (Curtis, 2003) and help people feel positive emotions (Brajsa et al., 2010). Leisure and tourism activities are also found to positively impact on individual's sense of identity (Barnes, 2008). Studies which aim to capture the full value of recreational activity most therefore incorporate both the economic and welfare value of these activities.

Travel cost models (TCM) have been widely used to estimate demand for recreational activities. Using the parameter estimates from a TCM one can derive both the economic and welfare value (consumer surplus) of recreational activities. Over the last decade, a number of studies have used TCM to value recreational activities in Ireland. These studies have examined the value of kayaking (Hynes and Hanley, 2006), angling (Curtis, 2003; Solon and Brunt, 2006), forest walks (Hynes et al., 2008) and non-commercial WBA (Curtis, 2003). In Ireland and internationally, studies using

TCM to value marine based recreation tend to focus on specific activities such as diving (Tapsuwan and Asafu-Adjaye, 2008; Morgon et al., 2007), surfing (Lazarow, 2007), beach recreation (Pendleton and Kildow, 2006) and angling (Curtis, 2002; Rolfe and Prayaga, 2007). Curtis (2003) is an exception and he examines the value of a number of WBA including swimming, angling, boating and other beach activities in Ireland.

Following previous research, this paper estimates the demand for and value of commercial WBA using a TCM in counties Galway and Clare. This is the first attempt to value the economic and welfare impact of commercial WBA in Ireland. Although, TCM are commonly used to provide a commercial value for non-market activities (Devkota et al., 2006), we hypothesis that the consumer surplus which arises from engaging in commercial WBA is much greater than the fee charged by the company. This excess consumer surplus may be due to a number of reasons including (among others);

- Individuals derive utility from engaging in a niche recreational market (Garrod and Wilson, 2004; Cawley and Gillimor, 2008),
- The sense of identity participants derive from engaging a recreation (Barnes, 2008)
- The ability to engage in recreational activities within an environmentally sustainable manner (Ferrari, et al., 2010) and;
- The ability to engage with companies with local knowledge (Garrod et al., 2006; Getz and Carlson, 2000) and a passion for the activity (Peter et al., 2009).

The objective of this paper is therefore two-fold. First we use a truncated TCM to estimate the demand for commercial WBA along the West coast of Ireland. Secondly, using the estimated parameters from the TCM, we calculate the consumer surplus (or welfare effect) that participants derive from engaging in commercial WBA. This will provide the first non-market value of commercial WBA in Ireland. A second point of interest is the local nature of the study. Examining companies in counties Galway and Clare allows one to derive the demand for and value of WBA in less developed coastal areas. The paper continues as follows: Section two introduces the two survey locations and provides an outline of the survey and data collected. Section three

describes the travel cost methodology. Section four is the results section and section five offers some concluding remarks.

2. Data: The Study Area and Survey Instrument

The West coast of Ireland is traditionally seen as a hot-spot for WBA. Its diverse underwater ecology is attractive to divers, while the waves off the coast of Clare, Sligo and Donegal attract both Irish and international surfers alike. This paper focuses on the demand for and value of commercial WBA in two coastal counties in the West of Ireland, County Galway and County Clare. Galway has a coastline of 1,298km in length and in 2010 nine of its [beaches](#) were awarded blue flags. The largest beaches are found in Roundstone and Renvyle in Connemara. In terms of marine tourism capacity, a study conducted by the Marine Institute (2002) identified Galway city and county as having significant potential to develop water based tourism utilising its current resource base. The three companies selected for this analysis in County Galway are based in North West Connemara. Connemara is traditionally a strong tourism destination for both domestic and overseas tourists. A proportion of North Connemara, Connemara National Park (2,999 ha) is designated a nature reserve.

Clare has a coastline of 360km in length and eight beaches in Clare were awarded blue flag status in 2010. Clare is renowned for its surf and there are six companies offering surfing activities in the county. The two companies chosen in Clare were located in the sea-side resorts of Lahinch and Kilkee in West Clare. Tourism, particularly domestic tourism has long been one of the mainstays of West Clare. However, the tourism industry in West Clare has been suffering over the last two decade as with many tourism resort areas in the British Isles (Garrod and Wilson, 2004). However, new marine-based tourism, notably marine ecotourism, is being developed in the area, with the Marine Ecotourism: A Marketing Initiative in West Clare (2001) highlighting the potential for marine-based ecotourism in the county.

Survey sampling is considered to be the most economically effective method to gather information on visitors to recreational amenities (Devkota, 2006). The data used in the paper was collected via face-to-face user surveys. These surveys were conducted on-site across the five WBA companies participating in the research during July and

August 2010. July and August was considered to be the peak season for each of the five companies. The target population for this study were individuals over the age of 18 years old who had participated in a water-based activity at the particular company site. The survey comprised three sections: Section 1 contained personal information and socioeconomic information, such as age, income level and occupation. Section 2 asked respondents how many trips they had made to engage in WBA in the previous twelve months. Focusing on the current trip, respondents were asked how many of miles travelled and the time taken to get to the company site. Respondents were also asked about their WBA experience (how many years they had engaged in WBA) and the number of free days they had to engage in WBA per annum. Section 3 consisted of travel cost questions. Individuals were asked to report their spending by local (within 25km of the company site) and non-local expenditure. Each question asked in the survey can be considered to be limited. The average response burden for each survey was five to ten minutes. One hundred and nine completed surveys were collected across the five company locations. Three of these surveys were spoiled and were not used. In total one hundred and six surveys were used for this analysis.

3. Methodology

This paper uses a travel cost model (TCM) to estimate demand for commercial WBA in Galway and Clare. Recreational TCM model demand for an activity as a function of the number of trips to each site per annum, trip price (the travel cost) and participants characteristics. A TCM predicts the number of visits that is undertaken by an individual to a WBA company (du Preez and Hosking, 2011). Implicit in the estimation of a TCM is the assumption of a negative relationship between the costs of trips and the number of trips made to a site (Hynes and Hanly, 2006). Price variation is introduced into the demand function via the differing travel cost for each participant to access the activity. Demographic factors such as gender and age are also of interest in TCMs, although they generally have a less dramatic impact on demand compared to travel cost (Hynes and Hanley, 2006). However, individual level characteristics can be important in explaining price and age differentials for particular activities and sites (McKean and Taylor, 2000). Ideally, the TCM should include a substitute site variable, because two visitors who travel an equal distance to a recreation site may

value it entirely differently, if one of the visitors has a substitute site closer to them (Bateman, 1993).

The discrete, non-negative integer nature of the dependent variable means that count data models offer the most robust and consistent estimator of trips (Creel and Loomis, 1990; Grogger and Carson, 1991). The Poisson model has been criticised because it imposes a mean-variance equality restriction on the model estimation which effectively requires the variance to be less than it really is (Green, 1993). This mean-variance equality has proven problematic in applied recreational work as the variance in trips is often greater than the mean (Morgon et al., 2007). Greater variance implies over-dispersion in the data, which will lead to the under estimation of standard errors in the Poisson model and the over estimation of the degree of precision in the coefficients (Cameron and Trivedi, 1986).

A popular alternative that accounts for this over-dispersion is the negative binomial model (du Prez and Hosking, 2011; Curtis, 2003; Hynes and Hanly, 2006). In a negative binomial model unobserved heterogeneity is captured by the addition of a parameter, α to the conditional mean. A further issue when applying count data estimators for assessing recreational demand using on-site surveys is that non-users are not sampled – the data is positively truncated (Chakraborty and Keith, 2000; Curtis, 2003). If this truncation is not recognised, inferences drawn about the population of potential benefits of commercial WBA from the resulting parameter estimates will be biased (Hynes et al., 2008; Creel and Loomis, 1990). This bias will also extend to the consumer surplus/welfare estimates derived from these parameters. To avoid this problem, one must modify the negative binomial distribution to reflect the truncation of observed trips, T_i (Hynes et al., 2008). Given the truncated nature of recreational trip data and if, over-dispersion has been identified in the survey data, a zero-truncated negative binomial (ZTNB) model is the most common method used to estimate TCM (du Preez and Hosking, 2011).

A travel cost function for commercial WBA may be specified as;

$$TRIP_i = f(TTC_i, EXPERIENCE_i, DAYS_i, SUBS_i, SE_i, \beta_o, \beta_k, \varepsilon_i) \quad (1)$$

where $TRIP_i$ is the number of trips to a WBA site in the previous year and TTC_i is the total travel cost for partaking in the WBA. $EXPERIENCE_i$ is the number of years each respondent has been engaged in WBA, $DAYS_i$ are the number of free days that each respondent has to engage in WBA per annum. $SUBS_i$ is distance to a substitute site and SE_i are a set of demographic and socio-economic variables for each respondent. The dependent variable, $TRIP_i$, is a function of the total travel cost, personal experience and leisure time and socio-economic characteristics to visit the site.

Recreation is a time-intensive activity and participants maximise utility subject to income and cost constraints (Hesseln et al., 2003). Within a TCM, costs in principle include all the marginal costs of making a visit, comprising ‘out-of-pocket’ costs (mainly fuel costs) and the cost of time spent travelling (mainly the opportunity cost of time not spent working). By combining actual travel costs and the value of travel time, research has found that the consumer surplus estimate may help minimise omitted variable bias (Hesseln et al., 2003; Tapsuwan and Asaffa-Adjaye, 2008). The total travel cost TTC_i of a trip may be defined as;

$$TTC_i = TC_i + TIMECOST_i \quad (2)$$

Where TC_i , out-of-pocket costs, is the total travelling cost incurred by the respondent to access to the WBA site from their point of origin. In calculating the ‘out-of-pocket’ costs for this study, the Automobile Association (AA) of Ireland’s calculations for the marginal costs of motoring for a car of average size were used (€0.29/mile). The inclusion of time costs in travel cost studies has been the subject of much debate (du Preez and Hosking, 2011), with some studies suggesting that to capture the true travel cost a fraction of the wage rate should be used to estimate the opportunity cost of time in addition to travel time/travel cost (Bateman, 1993; Zawacki and Bowker, 2000). The opportunity cost of time within travel cost models is generally calculated as the opportunity cost of lost labour (Bin et al., 2005; Martinez-Espineria and Amoako-Tuffour, 2008). A coefficient for the opportunity cost of lost labour of between 25 and 50 percent of the wage rate are recommended, with a fraction of 0.3 most often applied in the literature (du Preez and Hosking, 2011). Thus, lacking adequate data on

respondents' labour market situations, one may calculate the cost of travelling time ($TIMECOST_i$) as;

$$TIMECOST_i = HWAGE_i \times 33\% \times TRAVELTIME_i \quad (3)$$

Within this paper, the travel cost variable, $TIMECOST_i$ is valued at 33% of the value of hourly wages ($HWAGE_i$), whereby $HWAGE_i$ is calculated as an individual's annual income divided by 2,000 (the number of working hours per year). Total travelling time is an estimate of the time taken to travel from an individual's residence/accommodation to their destination. It is important to note that the issue of multi-purpose trips, a problem unique to TCM (Bateman, 1993) was not an issue as survey respondents were initially screened to ensure that participation in a WBA was the main purpose of their trip, rather than an 'additional' activity. Using the TCM and the survey described above, the next section examines the demand for and value of the WBA offered by five companies in counties Galway and Clare. This analysis provides us with the first comprehensive overview of the value of commercial WBA in Clare and Galway.

4. Results of the TCM

Using the data collected via on-site surveying, Table 1 presents a set of summary statistics for the respondents. As outlined in Section 2, the survey included questions on demography, socio-economic status, frequency of participation in WBA and costs incurred. Specifically, respondents were asked how many WBA trips they had taken in the previous twelve months, the cost associated with the trip, the number of years they had been engaged in WBA and the number of free days they had per annum to engage in WBA. The average number of trips to engage in a WBA by the respondents in the previous year was 8.25. The variance reported was 11.7 trips, indicating that the dependent variable (trips) is over-dispersed. The average travel cost for each respondent was €1,283. Respondents were on average 32 years old, had on average 7 years experience in WBA and had on average forty-four free days to engage in WBA.

Table 1 Summary Statistics of Variables used in the recreation demand model

	Mean	Standard Deviation	Minimum	Maximum
Number of Trips in the Last 12 Months	8.25	11.7	1	53
Number of Miles Travelled	125.2	78.36	0	310
Travel Cost	€1,283	€1,018	0	€5,940
Experience	7	9.76	0	45
Discretionary Time	44	80	0	365
Age	32	7	19	55
Income	€38,042	€22,352	€5,000	€75,000

Using the variables presented in Table 1 as the explanatory variables for the TCM, Table 2 presents the parameter estimates for the specified model. Four econometric specifications were used to estimate a commercial WBA demand model; including standard and truncated Poisson models and standard and truncated negative binomial models. The positive and significant estimate of the dispersion parameter, α , indicated that the data was over-dispersed. Thus, due to the over-dispersed and truncated nature of the data the final model chosen to estimate the demand function was a ZTNB. The models estimate of mean WBA trips is 8.55, which is very close to the actual reported mean of 8.25 trips per annum. This gives a strong indication that the model estimates are robust. The estimated coefficient for travel cost is the expected sign and significant at the 95% level of confidence. However, the impact of travel cost changes is relatively small or inelastic (-0.004).

This indicates that, although negatively related to trips, travel cost does not have a large effect on commercial WBA trips per annum. Individuals are willing to pay higher costs to access/engage in commercial WBA. Inelastic demand has been found in precious recreational demand models (Chakraborty and Keith, 2000; du Preez and Hosking, 2011). In terms of this study, the activities offered by the five companies examined are active (e.g. diving, surfing and sea-kayaking) and may be deemed somewhat more risky. These factors, combined with the local knowledge offered by

the WBA companies may offer an explanation for the inelastic demand reported by this paper.

Table 2 Zero Truncated Negative Binomial Model of WBA Trips per annum

Number of Trips per Annum	Coefficient	Std. Err.
Travel Cost (€)	-0.0004*	0.0002
Age 19-25 (Reference base Age 55+)	0.21	0.58
Age 26-35 (Reference base Age 55+)	-0.14	0.47
Age 36-45 (Reference base Age 55+)	0.12	0.45
Age 46-55 (Reference base Age 55+)	0.81	0.47
Gender (1 – Male, 2 – Female)	-0.20	0.25
Number of Years Engaged in WBA	0.06**	0.02
Income less than €10,000 (Reference base Income €75,000+)	-0.79	0.72
Income €10,001 - €20,000 (Reference base Income €75,000+)	-0.02	0.73
Income €20,001 - €30,000 (Reference base Income €75,000+)	-0.57	0.69
Income €30,001 - €49,999 (Reference base Income €75,000+)	-0.52	0.53
Income €50,000 - €74,999 (Reference base Income €75,000+)	-0.71	0.51
Distance to Substitute School	-0.0003	0.002
Days Engaged in WBA – 2 to 10 Days (Reference base 1 Day)	0.49	0.43
Days Engaged in WBA – 11 to 20 Days (Reference base 1 Day)	0.84	0.46
Days Engaged in WBA – 21 to 30 Days (Reference base 1 Day)	-0.08	0.51
Days Engaged in WBA – 31 to 45 Days (Reference base 1 Day)	1.16	0.76
Days Engaged in WBA – 46+ Days (Reference base 1 Day)	0.99*	0.41
Constant	0.35	0.98
A	0.87	
Number of observations	106	
Likelihood Ratio χ^2	59.95	
Probability > χ^2	0	
Pseudo R²	0.1957	

The marginal effects of the travel cost variable can be used to estimate the opportunity cost of travel time. The marginal effect of the covariates on mean WBA trips is given by (Curtis, 2003):

$$\frac{\partial E(T | X)}{\partial x_i} = (1 + \alpha)\lambda_i\beta_j \quad (4)$$

Where λ_i is the predicted number of trips (8.55), β are the parameter estimates of interest (for example travel cost) from the observed sample and α is the over-dispersion parameter. For each €50 increase in the travel cost, the number of WBA trips falls by 3%. The low marginal effect of trip cost on the number of trips demanded is again indicative of the high price individuals are willing to pay to engage in WBA offered by commercial companies. As expected, respondents with highest level of discretionary time to engage in WBA (greater than 45 days) are significantly more likely to have a greater number of WBA trips per annum. The insignificance of the income parameter suggests that there is no income effect on the number of trips an individual takes to engage in WBA. Given the expensive nature of WBA, average travel cost for this sample is €1,283, this result may seem implausible. However, previous research on recreational TCM have found insignificant and even negative income effects (Chakraborty and Keith, 2000; Curtis, 2003). The insignificant substitute site variable indicates that the activities offered by each commercial WBA are more important than site location. The other variables in the model, age, gender and distance to a substitute site are all insignificant.

5. Consumer Surplus and Welfare Analysis

The goal of this paper was not merely to estimate the parameters of the TCM, but rather to use these parameters as an input in calculating the economic value of companies offering WBA in counties Clare and Galway. Consumer surplus (CS) was estimated following Hellerstein and Mendelson (1993) methodology for consumer utility maximisation subject to an income constraint and where trips are a nonnegative integer. They show that the expected value of CS, $E(CS)$, derived from count model may be expressed;

$$E(CS) = E(T_i|x_i)/\beta_p = i/(\beta_p) \quad (5)$$

where i is the expected number of trips and β_p is the price (i.e. the travel cost) coefficient. The per-trip $E(CS)$ may be calculated as i/β_p (Hynes and Hanly, 2006;

Tapsuwan and Asafu-Adjaye, 2008). In the preferred model, the travel cost coefficient was estimated to be -0.0004. This implies that CS per trip is €2,500. However, given the sensitive nature of CS estimates it is important to have an appreciation of the reliability of any value. They suggest that an indicator of reliability may be obtained from the "standard error and a consequent interval estimate". The population estimate of per-trip CS is estimated at 95% confidence to be between €1,250 and €3,616. The estimated average WBA trips per year in the full 109-person sample were 8.55. Total CS per WBA participant per year is calculated as average annual trips by surplus per trip or $8.55 \times €2,500$. This gives an annual per person CS of €21,375. This implies that the annual value of the WBA offered by the five companies within this survey or conversely the willingness to pay for these WBA by the sample respondents is €2,265,750 per year. The population estimate of total CS is estimated with 95% confidence to be between €1,132,875 and €2,866,626. These results indicate a high value WBA in the West of Ireland, even when individuals must pay for these activities. It is useful to compare the welfare estimates with those derived in other WBA studies.

As outlined in the introduction, studies recreational demand studies in Ireland tend to focus on non-marine/water based activities. However, Curtis (2003) used a TCM examined four WBA, sea-angling, boating, swimming and beach/island trips. He found that sea-angling had a CS of €8, boating €11.95, swimming €71.69 and other beach activities €18.90. Similar to this analysis, he found that all four activities were very price inelastic at the mean level of day-trip costs. However, he further found that at higher trip costs demand for boating, swimming and other beach/sea trips became inelastic. WBA are very diverse in terms of the product on offer, the level of fitness one requires, the risk associated with the activity, etc. The WBA examined by Curtis (2003) are relatively passive and low risk. In contrast, the activities offered by the five companies examined in this paper are active (e.g. diving, surfing and sea-kayaking) and may be deemed somewhat more risky. These factors, combined with the local knowledge offered by the WBA companies may offer an explanation for the high levels of CS associated with companies that offer WBA in this study. Given these issues, a simple comparison of CS between the two studies is somewhat hard to interpret.

6. Discussion

This paper presents the first analysis of the demand for and value of commercial marine WBA in Ireland. Previous research on marine and coastal WBA has focused on the value of free WBA, including beach activities, angling, boating and swimming (Curtis, 2003). International research has indicated that outdoor enthusiasts demand and value niche recreational markets for non-economic reasons. These reasons range from the desire to engage in niche market (Crouch and McCabe, 2003; Garrod and Wilson, 2004; Cawley and Gillimor, 2008), the sense of identity participants derive from engaging in a particular recreation (Barnes, 2008), the ability to engage in recreational activities within an environmentally sustainable manner (Ferrari, et al., 2010) and the ability to engage with people with companies who have a local knowledge of the environment and a passion for the activity (Garrod et al., 2006; Getz and Carlson, 2000; Peter et al., 2009). Given this background, this paper hypothesised that the value derived by WBA participants from engaging in the activities offered by the five companies of interest would exceed the price paid for such activities.

This paper found that the mean consumer surplus for the average WBA participant who used one of the five companies of interest was €2,500 per trip. This result is conditional on the survey sample but still indicates a high value for companies that offer WBA in the west of Ireland. Average travel cost was €1,283 compared to the CS value of €2,500. Given that CS is 49% of total willingness to pay this would suggest that individuals receive approximately double the benefit from engaging in the WBA offered by the companies in excess of their travel costs. This indicates a total CS figure of €2,265,750. Calculating population confidence intervals the total CS is estimated with 95% confidence to be between €1,132,875 and €2,866,626. As hypothesized individuals that engage in WBA place a higher value on the activities that are offered by the five companies within this paper. Thus, the activities offered by WBA companies are worth more than their market price as engaging in commercial WBA represents a large welfare benefit for participants.

In terms of public policy the *Marine Tourism and Leisure Development Strategy 2007-2013* (Marine Institute, 2007) outlines the development of a sustainable marine tourism sector for Ireland. Morrissey et al., (2010) found that the marine tourism

sector generated €944 million in turnover and provided €453 million in gross value added to the Irish economy in 2007. Within the wider marine tourism sector, WBA provided €74 million of this turnover. Capturing the market and non-market value (welfare effect) of commercial WBA in Galway and Clare, this paper highlights the high value that recreationalists place on WBA. These findings demonstrate the important economic and social role WBA have to offer coastal areas and thus provide an impetus for future development in this area.

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