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What determines whale watching tourists' expenditure? A study from Hervey Bay, Australia

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Abstract

In Australia, whale watching has become a popular tourist attraction at a number of sites along the east coast of Australia and contributes significantly to their regional economies. This study assesses the determinants of whale watching tourism expenditure at Hervey Bay located on the Fraser Coast in Queensland. A survey was conducted which derived individual micro-level data from tourists on whale watching tours at Hervey Bay during the months of July to October. Using both linear and quantile regression models, the main determinants of tourism expenditure are revealed. The results show that, in addition to income and origin, tourism expenditure is significantly driven by socio-economic, trip-related and psychographic characteristics.

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Hervey Bay, quantile regression, tourism expenditure, whale watching

Introduction

Whale watching is now a highly popular tourism activity in Australia. This article is designed to assist tourism policy development by investigating the extent to which a set of micro-level determinants can explain the variations in whale watching tourists' expenditure. Identifying the determinants of tourism expenditure can help business operators increase the economic contribution of such activities (Saayman and Saayman, 2012) and explain how the region is affected economically (Marrocu et al., 2015; Rolf and Flint, 2018).

Overall, micro-level research on tourism expenditure predominantly examines the factors that address the following dimensions: (a) how much the tourists spend, (b) what influences the expenditure and (c) which goods visitors prefer (Brida et al., 2018; Tisdell and Wilson, 2012; Wilson and Tisdell, 2003). The variables that have been found to influence tourists' spending behaviour include income, age, gender, education and employment (Wang et al., 2006). However, an issue that has received very little attention in the literature is the determinants of whale watching tourism expenditure.

In Australia, Queensland and New South Wales attract the greatest number of whale watchers, which is around 155,000. The direct benefit has been put at US$5.4 million and the total economic benefit at US$34.6 million (Schaffar and Garrigue, 2007). Hervey Bay is regarded as the humpback whale watching capital of the South Pacific and was the first such site in Australia. In 2015, the Fraser Coast attracted 734,000 tourists who contributed AUD$311.8 million to the Fraser Coast's regional economy (TEQ, 2015).

The remainder of the article is organized as follows. The second section presents the data and variables used in the study. In the third section, empirical models are explained. In the fourth section, results of the study are discussed. Finally, the fifth section concludes and presents the implications of the study.

Data and variables

The data for this study were collected from a survey conducted in the Hervey Bay region of the Fraser Coast, Queensland, during July to October 2000.[1] A total of 666 completed surveys were obtained from tour operators who distributed questionnaires among non-resident whale watching tourists. The survey results show that the daily expenditure per tourist was AUD$74.50, although international tourists spent more per day (around AUD$80)[2] (Online Appendix, Table A1). On average, a party size of 3.7 tourists stayed at Hervey Bay around 4 nights. Almost all (99%) international travellers were visiting Hervey Bay for the first time and over two-thirds visited multiple regional tourism sites (Online Appendix, Table A2).

To address the heterogeneity of the survey data, we used a comprehensive set of explanatory variables (Table 1). Daily individual tourism expenditure expressed in Australian dollars is the dependent variable. Primary inspection of the data indicates that the dependent variable does not meet the normality assumption for regression analysis. Hence, a log transformation was conducted following the approach of Dayour et al. (2016). As some of the explanatory variables were non-metric in structure, dummy variables were used.

Table 1. Description of the variables.

Variables	Description
State	State of hometown of the respondent
Country	Country of residence of the respondent
See whales	Has the respondent seen humpback whales at Hervey Bay before?
See whales at other locations	Has the respondent seen whales at any other Australian locations?
Party size	Number of tourists in the group during this visit
Trip reason	The main reason for this trip
Nights	Number of nights staying in the Hervey Bay area during the trip
Purpose	Was whale watching the main purpose of this trip?
Visited other sites	Other places visited during this trip
Per day costs	Costs/day for the whole group during this trip
Age	Age of the respondent in years
Gender	Gender of the respondent
Education	Highest educational qualification of the respondent
Employment	Employment status of the respondent
Income in AUD	Household income (after tax) of the respondents' family in Australian dollars (thousands AUD$)
Partner, children, relatives, friends	Type of accompanying tourists with the respondent

Empirical model

We adopt Wang et al.'s (2006) classifications of tourist expenditure determinants using four groups of explanatory variables: economic constraints (EC), socio-demographic (SD), trip-related (TR) and psychographic (PG) to formulate the empirical model

$$\text{tourism expenditure}_i = f(\text{EC}_i,\ \text{SD}_i,\ \text{TR}_i,\ \text{PG}_i) \tag{1}$$

The empirical analysis is based on both ordinary least squares regression and quantile regression techniques. The empirical model for the study can be formulated as the following

$$y_i = \beta_0 + \ \beta_1\text{EC}_i + \beta_2\text{SD}_i + \beta_3\text{TR}_i + \beta_4\text{PG}_i + \varepsilon \tag{2}$$

Here, y_i is the log-transformed per person per day tourist expenditure. β_0 is the constant term, whereas $\beta_1 \ldots \ \beta_4$ are the coefficients showing the relationships between the regressors and the regressands. ε is the error term assumed to be normally distributed with zero mean and constant variance.

The basic quantile regression can be expressed as the following

$$y_i = \beta_\theta x_i + u_{\theta i} \text{ with } Q_\theta(y_i|x_i) = \beta_\theta x_i \tag{3}$$

Here, x_i denotes a vector of regressors, β_θ represents the vector of parameters to be estimated, $u_{\theta i}$ is the vector of residuals, θ represents each specific quantile and $Q_\theta(y_i|x_i)$ represents the θth conditional quantile of y_i given x_i. The θth quantile regression solves the following function

$$Q(\beta_\theta) = \sum_{i:y_i \geq x_i\beta}^{N} q|y_i - x_i\beta_\theta| + \sum_{i:y_i \geq x_i\beta}^{N} (1-q)|y_i - x_i\beta_\theta| \tag{4}$$

The quantile regression estimator for any quantile q, $\hat{\beta}_\theta$ is derived by minimizing the objective function (4) and by applying a linear programming technique. We obtained the median quantile regression by setting $\theta = 0.5$. Additionally, to further investigate the relationship of selected explanatory variables to tourism expenditure distribution, the results for the 10th, 25th, 50th, 75th and 90th quantiles were analysed. Bootstrap standard errors were computed with 1000 replications.

Results and discussion

Table 2 and Online Appendix Table A3 present the results of the linear regression model. The results clearly show that income is one of the most prominent influencing factors on tourism expenditure decisions. A significant addition of 5.5% to the expenditure can be expected if there is an increment of AUD$1000 to the annual disposable income of the visiting family. Socio-economic characteristics – education and employment – did not show significant impact in the overall analysis (Table 2). However, the analysis taking primary education as the reference group shows that a higher level of education did significantly increase a tourist's expenditure for domestic tourists but not for international tourists (Online Appendix, Table A3). Similarly, for employment, when retired is taken as the reference group, employment status shows a positive impact on tourism expenditure (Online Appendix, Table A3). For age, a small positive effect (0.09%) was found in the case of international tourists.

The party size and the length of tour show negative correlation with tourism expenditure. One additional person in the visiting group will reduce the per-person daily expenditure by 11% and an extra one night's stay will decrease the per-person daily spending by 2.6%. The equivalent figures for international and Australian resident travellers are 19%/6.7% and 11%/2.3%, respectively.

Table 2. Linear regression model for tourism expenditure and the determinants.

	Overall	Australian	Queenslander	International
Economic constraints				
Income	0.0546***	0.0459***	0.0383*	0.0451
Socio-economic characteristics				
Age	0.0034	0.0017	0.0006	0.0091*
Education	0.0062	0.0116	0.0258	0.0085
Employment	−0.0176	−0.0093	−0.0039	−0.0286
Trip-related characteristics				
Party size	−0.1147***	−0.1081***	−0.1082***	−0.1881***
Length of stay	−0.0263*	−0.0231*	−0.0586***	−0.0676**
Holiday/day trip visitor	0.0490	0.0547	0.1443	–
Psychographic characteristics				
Trip reason	−0.0249	−0.0332	0.0245	0.0049
Whale watching main purpose	0.1366	0.1347	0.1699	0.3255
First-time/repeating visitor	−0.0996	−0.0928	−0.2022*	−1.1015***
Watched whales in other locations	0.0063	0.0267	−0.0075	−0.1138
Constant	4.1688***	4.1807***	4.1099***	4.2407***
R^2	0.4462	0.4610	0.5480	0.5150

Note: *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Table 3. Quantile regression model for total expenditure and the determinants (all tourists).

	$q = 0.10$	$q = 0.25$	$q = 0.50$	$q = 0.75$	$q = 0.90$
Economic constraints					
Income	0.0866***	0.0651***	0.0469**	0.0397*	0.0142
Socio-economic characteristics					
Age	0.0087*	0.0014	0.0031	0.0040	0.0031
Education	0.0244	0.0021	-0.0037	0.0066	0.0184
Employment	−0.0061	−0.0176	−0.0246	−0.0135	0.0029
Trip-related characteristics					
Party size	−0.1318***	−0.1508***	−0.1455***	0.1147***	−0.0882***
Length of stay	−0.0414*	−0.0338*	−0.0348**	−0.02633	−0.0187
Holiday/day trip visitor	−0.0298	−0.0429	0.0011	0.1244	0.1338
Psychographic characteristics					
Trip reason	−.0513	−0.0797*	−0.0359	−0.0164	0.0147
Whale watching main purpose	0.0468	−0.0028	0.1612	0.2251	0.1862
First-time/repeating visitor	−0.2038	−0.1242	−0.1212	−0.0479	0.0061
Watched whales in other locations	−0.0343	0.0562	0.0517	−0.0891	−0.0865
Constant	3.2567***	4.3223***	4.4839***	4.4484***	4.6150***
Pseudo R^2	0.3750	0.2971	0.2324	0.1661	0.1543

Note: *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Overall, foreign tourists tended to spend 8% more than the Australian resident tourists which is in line with the studies of Marrocu et al. (2015) and Wu et al. (2013). First-time visitors spend 16% more than repeating visitors and first-time international tourists 114% more (Online Appendix, Table A3). Expenditure was significantly reduced, while tourists were entertaining visitors – 45% less.

The results of the quantile regressions for all tourists combined are reported in Table 3 and Online Appendix Table A4. Income has a significant effect on tourism expenditure throughout most quantiles. A negative and significant relationship is found between tourist expenditure and the size of the visiting group and the number of nights spent on holiday. From Online Appendix Table A4, income is shown to have a significant effect on tourism expenditure at the 10th quantile. In the first quantile ($q = 0.10$), tourists with an income over AUD$20,000 can be expected to spend within a range of 88% to 116.8% more compared to the expenditure of the lowest income earner (column 1 of Online Appendix Table A4). But it is only the over AUD$70,000 earning group who spend significantly more – 47% more – than the lowest earning tourists in the 25th quantile (column 2, Online Appendix Table A4). Also evident is that males spend significantly less (18%) at the highest quantile. Tourists with a high level of education spend significantly more compared to the primary educated tourists at the 90th quantile. If retirees are the reference group, self-employed and full-time tourists spend significantly more (40%) at the 25th and 50th quantile.[3] International tourists tend to spend significantly more (20%) than the Australian tourists at the highest quantile.

Tourists on holidays can be expected to spend 34% more than day visitors at the highest quantile. First-time visitors to Hervey Bay Marine Park spent 45% more ($q = 0.10$) compared to repeating visitors. In contrast to the linear regression results, whale watching, as the main purpose of a holiday at Hervey Bay, was found to produce a significant addition to tourism expenditure

(34% more) compared to other purposes at the highest quantile ($q = 0.90$). Moreover, tourists with other reasons for travelling, spent significantly less [81% ($q = 0.10$), 51% ($q = 0.25$)] compared to family holiday expenditure. Those tourists who watched whales at other tourism destinations tended to spend 29% more ($q = 0.25$) but 18% less ($q = 0.90$) at the two different quantiles.

Conclusions

This study provides an empirical investigation of expenditure decisions of tourists involved in whale watching activities at Hervey Bay Marine Park. The results show that higher income (more than AUD$40,000 per year), higher educational qualifications (completion of year 10 or more), employment status (full-time employed, self-employed and trade trainee), reason for the trip (family holidays), first-time visitor (repeating tourist) are among the significant influencing factors on the spending decisions of tourists. However, the party size and length of stay had a notable adverse relationship with tourism expenditure.

The results reveal that the international tourists tend to spend more indicating that policy makers and tourism industry managers need to initiate effective strategies in key overseas markets to promote Hervey Bay as an attractive tourist destination. In terms of income, international and domestic medium and high-income tourists need to be targeted, as do well-educated tourists. To encourage repeat visits, promotion of a network of regional sites is recommended – that is, beaches, theme parks, museums, and national parks in the Fraser Coast region. The substantial group of low spending tourists (most importantly students) can be targeted by offering low-cost packages during weekdays and the off-peak months. This would make a valuable contribution to the local economy by reducing the seasonal pattern of tourism demand not only in Hervey Bay but in the Fraser Coast region generally.

This study has certain limitations, mainly due to the survey's limited sample size. Similar studies with larger samples would therefore be a useful addition to the literature, as would comparisons of data from multiple years. Testing for the relevance of other cultural, historical or psychological factors could be incorporated in future studies.

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Supplemental material

Supplemental material for this article is available online.

Notes

1. We acknowledge that the data collected in 2000 may be somewhat dated. However, the whale watching industry in Australia, and in particular in Hervey Bay, is currently attracting tourists with a similar profile.

Since this study has gathered data by interviewing whale watching visitors touring Hervey Bay, analysing their expenditure should still provide a useful and in-depth understanding of the current whale watching tourists' expenditure and particularly given there has been no subsequent survey. This article will also provide a means for measuring consistency and change in tourists' preferences over time when a new survey can be conducted.

2. Domestic travellers from different states had a similar average per day tourism spending – Queenslanders AUD$71.86 and average inter-state AUD$72.92. There is an increasing trend of tourist daily expenditure. In 2017, on average, tourist in Australia spend AUD$157 per night, and the average spend per trip is $5088 (Tourism Australia, 2018).
3. However, trade trainees tend to spend both 69% more ($q = 0.10$) but 92% less ($q = 0.90$) at the two different quantiles.

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