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Pricing and Preserving Unique Ecosystems: The Case of the Galapagos Islands

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PRICING AND PRESERVING UNIQUE ECOSYSTEMS

The case of the Galapagos Islands

A Dissertation Presented

by

CESAR VITERI MEJIA

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Resource Economics

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DEDICATION

I want to dedicate this work to my partner in life Andrea and my little son Matias. Their support, help, love and laughs made easier to achieve this goal. I will always be in debt with both of you. Thanks!

I also want to dedicate this work to my family: mom, dad and brothers, and especially to the memory of my dear brother Julio. I always had his support, protection and love since we were kids. I wish you were here!

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My infinite gratitude to all the people who makes this great department in UMASS - staff, faculty and students – and all my friends at UMASS, your human spirit and warm heart help me a lot in the happiest and saddest moments of my life.

ABSTRACT

PRICING AND PRESERVING UNIQUE ECOSYSTEMS

The case of the Galapagos Islands

May 2011

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Directed by: Professor Sylvia Brandt

This study contributes to the discussion of managing tourism to a protected area in a developing country (Galapagos, Ecuador). The first part of the analysis provides quantitative data about preferences of tourists and potential impacts on park revenues from price discrimination. It uses the data from a choice experiment survey conducted in the summer of 2009 in which these four attributes of a tour of the Galapagos were described: tour length, depth of naturalist experience, level of protection of Galapagos from invasive species, and price of the tour. On average the Galapagos tourist would be willing to pay slightly more than 2.5 times for a trip with a high-level of environmental protection than for a trip that is equivalent on all other characteristics but has a lower level of environmental protection. The mean marginal willingness to pay (MWTP) for a trip with an in-depth naturalist experience is 1.8 times more than that for a trip with a less detailed naturalist experience but equivalent on other characteristics. The relatively inelastic demand for travel to the islands would allow managers to adjust access fees to shift the distribution of length of trips while not affecting the revenues.

The second part of the analysis evaluates the influence on travel to the islands by depicting Galapagos as a standard market commodity as well as depicting it as an environmental commodity. This analysis compares the results obtained from two different choice experiment

surveys given to tourists finishing their trip to Galapagos. One survey design portrays the archipelago as a standard holiday island destination while the other design highlights the uniqueness and vulnerability of the islands' biodiversity and the challenges that tourism poses to the islands' conservation. Results suggest that additional information modified an individual's decision-making process. In the first design case (which excludes environmental information), the influence of attributes such as length and depth of natural experience is attenuated. The MWTPs estimated for these attributes are smaller in absolute terms although differences on the MWTP are not statistically significant.

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CHAPTER I

THE GALAPAGOS ISLANDS AND THE TOURISM INDUSTRY

A Growing Industry

The tourism industry in the Galapagos Islands has experienced an extraordinary growth in the last decades. Tourism started in 1969 with the first cruise ship "Lina A". Ten years later the National Park recorded 11,756 visitors, and 18,000 visitors during the mid 1980s. But figures for visitors started to rise exponentially during the late 1990s and the beginning of 2000. The year 2001 saw close to 78,000 visitors and growth continued to 173,000 during 2008. Most of these visitors are foreigners (70% in 2008), contributing more than 85% of the revenue generated by the tourism industry in the islands (Plan de Manejo Parque Nacional Galapagos, 2005). Some experts attribute the growing number of tourists to the increased popularity of the archipelago in the United States, the source of most of the foreign tourists— first, because of increased diffusion of the archipelago in educational TV shows, and second, because after 9/11, the Galapagos is considered a more friendly destination than other exotic islands in Asia (A. Drum, S. Cazar and C. Grenier, personal communication, 2009).

The growth of tourism has been accompanied by a change in the type of visitor and the way in which tourism is organized on the islands. From the Galapagos tourism industry's recent reports, it is possible to describe the evolution of the visitor profile in the islands. In the early days, tourists tended to be nature-loving people interested in learning about Darwin, and visits were organized mainly by local boat owners in small groups led by highly-qualified guides. Current tourists are less nature-focused, less informed about the islands' uniqueness, and participate in tour packages purchased abroad (Egret and ARA, 2001; Watkins and Cruz, 2007; Taylor *et al.*, 2006). Scientists assert that approximately 40% of current visitors can be considered naturalist tourists while the rest are adventurous tourists looking for extreme

experiences (F. Cruz, personal communication, 2009). Services related to tourism activity have also evolved. Epler (2007) reports a significant increase in the passenger capacity of boats: from 597 in 1982 to 1,805 in 2006. Inland infrastructure has grown as well from an almost total lack of services during the early 1980s to a total capacity in 2006 of 1,668 hotel beds plus 114 bars and restaurants.

Economic Growth, Immigration and Invasive Species

Growth of the tourism industry in the Galapagos has fueled a chaotic economic expansion in the islands and triggered serious threats to their long-term conservation: the growth in human population due to immigration, the concurrent increased risk of introducing alien species, and increased pressure on local resources. Taylor *et al.* (2006) underscore the economic expansion, citing the 78% increase in total income in the Galapagos in the period 1999 to 2005, an annual growth rate of 9.8%. Most of that expansion is explained by growth in tourist expenditures. In contrast, the per capita income in the same period grew only 1.8% annually — a result of the overall income's expansion being neutralized at the per capita level by the rapid increase of population in the islands. The human population grew by almost 60% over this six-year period[1]. This high migration prevents local people from receiving benefits from tourism, creates unequal income distribution, and diminishes the incentives to conserve for those who are in the bottom of the income distribution (Taylor *et al.,* 2006).

While income and population increased, the number of registered introduced species has jumped as well — from 112 species in 1900 to more than 1,321 recorded in 2007. To understand the dimension of the alien species issue, consider the fact that the Galapagos is the only oceanic ecosystem that remains close to its pristine condition. Scientists estimate that at least 7,000 hardy species living in the Galapagos are among the most distinctive on Earth: 97% of reptiles and

[1] Taylor J.E. et al. (2006) estimates that every US$3,000 increase in income flowing to the Galapagos results in approximately one additional person on the islands.

mammals, 80% of land birds, 50% of insects and 30% of plants in the Galapagos are endemic to the islands. Alien species are a great threat to the local biodiversity: without natural predator or other controlling factors, they can invade complete habitats. Currently, 60% of the 180 endemic plants are in danger of extinction according to the standard IUCN Red List of Threatened Species. The number of documented full species and subspecies extinctions are 13 and 39 respectively, of which 11 extinctions are directly attributable to alien species (Watkins and Cruz, 2007; Rogg *et al.*, 2005; Bensted-Smith *et al.*, 2002).

Managing the Pressures from Tourism and Economic Growth

Tour operators and park officials assert that tourism worked relatively well under the original guidelines: limited visiting sites and trails, guides to accompany visitors, fixed itineraries, and a limit on number of concessions. The system is now under considerable stress because of tourism's high growth rate and the limited resources allocated by the Ecuadorian Government to manage this activity. They add that original guidelines did not provide mechanisms to limit volume when demand increased, and that it has been difficult to adjust to unanticipated pressures due to tourism demand and changing tourism technologies (Egret C. & ARA C., 2001).

Initiatives to stop the growing waves of tourists (e.g., cap on the number of visitors) have not been successful because the income generated by tourism activity is the main financial resource on which local institutions depend. These institutions include National Park, the provincial government, national army, the quarantine system, and the regional planning agency. Thus a decision that affects tourism revenues meets opposition not only from the tourism sector, which was successful in curtailing a fee increase during 2008 (F. Ortiz, personal communication, 2009), but also from a broad local base that benefits from a large number of visitors.

Efforts of park managers to deal with the excessive flow of tourist have focused on: i) implementation of an enhanced monitoring system for visitor activities, ii) improvement of the itinerary system, and iii) control of the number of boats and operation permits. This last item

comprises permits granted by the National Park to tourist operators and boat owners to provide their services within the park. This permit system also works as sort of quota in that the permit states the number of passengers that each boat is allowed to transport.

Operation of the Permit System: Long Trips versus Short Trips

Although the operation permit system is designed to control the flow of travelers, the tourist growth rate is difficult to curb because the industry's response is to bring a higher proportion of visitors for ever shorter lengths of stay. Epler (2007) finds it erroneous to consider that operation of the permit system alone is able to cap (limit) the number of visitors, the overall visitation, and the number of cruise boats. He demonstrates that the profit maximization behavior of permit holders can lead to a reduction in the number of days of a typical trip but an increase in the number of passenger they serve per year. He cites a 16-passenger boat handling 540 passengers/year and offering 7 day trips that — *ceteris paribus* —- can cater 945 passengers/year if it reduces the length of the trip to 3 or 4 days.

The trend of visitors toward shorter stays is corroborated in a survey applied by Oleas (2008): during 2007, the percentage of visitors staying 6 nights or fewer was approximately 35%[2] , almost twice the percentage for small trips recorded by Epler on 2006. There is no formal analysis of the causes of this trend in the Galapagos, but it could have originated as a supply strategy to make affordable the destination to more persons[3]. McElroy (2003) supports the idea that this trend could be originated in the supply side, classifying a group of 51 islands worldwide according to their level of tourism penetration. He points out that islands with a high level of tourism penetration show a market that is dominated by shorts stays (6.2 nights) while island with low levels of tourism penetration show longer stays (10 nights). Studies of other places facing

[2] We found roughly the same proportion: 33% of visitors in our sample had short trips fewer than 6 nights.
[3] F. Cruz asserts that the shrinking of tour days has reduced the price of the tour packages, making travel to the islands more affordable (F. Cruz, personal communication, 2009). This assertion is confirmed with our data collected during the summer 2009: we record that the median price for short trips is US$ 1,500, while the median price for long trips is US$ 3,200.

the same issue explain the decreasing stay length as demand side responses. Alegre and Pou (2006) state that in the Balearic Islands (Spain) the time that visitors spend on holiday is shrinking drastically because of the aging population, the family structure (more families where both spouses work outside home), and the change in tourist habits (people prefer shorter more frequent holidays to a single long holiday). Other authors such as Gokovali *et al.* (2007) and Fleischer and Pizam (2002) find that socioeconomic characteristics, including the visitor's level of income and the change in travel habits, are affecting length of stay for other destinations (Turkey and Israel, respectively).

Officials interviewed from the Charles Darwin Foundation and the National Park agree that the ideal Galapagos experience should be a long stay, free of stress, in solitude, and in contact with nature— and that visitors on a short stay are receiving a diminished experience and an absence of educational aspects. They also consider that short trips contribute to the change in tourist type— from a nature-loving person to one with less concern about (the uniqueness of) the ecosystem they are visiting. Naidoo and Adamowicz (2005) point out that the increase in number of visitors unaware of biodiversity can put a protected area at risk as well as compromise it long-term conservation objectives.

Changes in length of stay have been widely discussed among policy makers, scientists, and non-governmental organizations. They propose to establish a price scheme based on the length of stay in the islands, a scheme that rewards visitors who stay in the islands longer (low entrance fee) and punishes those who stay for just a few days (higher entrance fee). As an illustration, the archipelago Fernando de Noronha (Pernambuco, Brazil) has a price scheme based on the length of stay. For the first 4 days, the daily fee is R$ 36 (Brazilian Reais, approximately US$16); from the 5th to 10th day, the fee drops slightly to R$ 29 per day (US $ 13). Beyond the 11th day to the 30th day, the fee increases to R$100 per day (US$ 44)[4]. Park Managers and

[4] Source: http://www.fernando-de-noronha.org/information/environment-tax.php

scientists expect this price scheme to slow down the flow of visitors and to improve the educational experience of the tourist in the archipelago, assuming that those who choose longer trips are visitors who want to have a deep natural experience in the islands and that, in contrast, those who choose a shorter stay are less informed about the Galapagos and are motivated by factors other than the unique ecosystem of the islands.

The past practice of limiting boat operation licenses is no longer an effective tool to manage the number of visitors to the Galapagos, nor to reduce the threat of invasive species. Now the focus is on identifying tools to modify the typical length of stay through a pricing policy. While there are other policies to potentially control the flow of tourists, such as a cap on visitors, or auction of visitor permits, these policies have been eliminated from discussion due to the pressures of stakeholder in the tourism industry. In the next chapters I describe the methodology I used to elicit the valuation of various attributes of a visit to the Galapagos and how this information could be utilized to meet policy goals.

CHAPTER II

METHODS: CHOICE MODELS, DESIGN OF THE CHOICE EXPERIMENT, AND DATA COLLECTION

Decision Models

This study aims to address particulars behind a traveler's decision-making process when choosing to take a trip to the Galapagos Islands. Those details can provide information for park managers to develop suitable policies in order to tackle problems arising from high visitation to the islands. Analysis focuses on four attributes relevant to policy makers and consumers alike: length of the trip, type of experience, protection of the ecosystem against invasive species, and price of a tour within the archipelago.

This study uses a stated choice method to estimate the willingness to pay for different levels of these attributes. The stated choice methods use flexible approaches to collect data on preferences from individuals in a constructed scenario (Adamowicz *et al.,* 1998). This methodology is widely used in analysis of tourism and consumer preferences with regard to environmental quality attributes, evaluating attributes such as biodiversity in national parks, quality of accommodation facilities, landscape features, likelihood of observing wildlife, restrictions of use, availability of information, recreational services, risk of overcrowding, and changes in water quality among others (Hearne and Salinas, 2002; Naidoo and Adamowicz, 2005; Alvarez-Farizo *et al.*, 2007; Hanley *et al.*, 2006; Brau and Cao, 2006).

The stated choice survey generates behavioral data that are consistent with well-established consumer theories. Theoretical foundations of this technique include: i) The Lancastrian consumer theory, which states that goods by themselves do not provide utility of the consumer. Characteristics of the goods result in consumer satisfaction, thus the utility of a good can be broken up in the fraction of utilities given by its attributes (Lancaster, 1966). ii) Theories

of information processing, of judgment, and of decision-making in psychology, e.g., Hammond (1955), Slovic and Lichtenstein (1971), and Anderson (1970, 1981, 1982) respectively. iii) The random utility theory which underpins consumer behavior in economics, e.g., Thurstone (1927), McFadden (1974), Manski (1977), and Yellot (1977).

McFadden (1980) assumes a random utility function to accommodate the inability of individuals to differentiate among choices and the inability of researchers to measure all components of the utility function. As in the standard theory, Thurstone (1927) proposes that the consumer will choose the good liked best. The researcher cannot account for all factors specific to each individual. Because individual factors are idiosyncratic, they are random from the researcher's perspective. This can be explained by adding a random component to the consumer utility function. The next paragraphs present the work developed by McFadden (1973) and Adamowicz *et al.* (1998). The utility function is represented as:

$$U_{ij} = V_{ij} + \varepsilon_{ij}$$

Where U_{ij} is the unobservable true utility of individual "*i*" when choosing alternative "*j*"; V_{ij} is the observable systematic component of the utility; and ε_{ij} is the random component. The random term represents the omission of variables by the researcher, measurement errors, lack of attention of the consumer to particular decision, and errors of perception by the consumer among other aspects. The expected value of the random error is zero.

Due to the presence of randomness, it is possible to model the probability of the consumer's choice of one alternative *j*, over all alternatives *k*: in the choice set *C*. It can be written as:

$$P(j/C) = \Pr[U_j > U_k] = \Pr[(V_j + \varepsilon_j) > (V_k + \varepsilon_k)], \forall k \in C$$

Knowing determinants of the systematic component in the utility function, it is possible to specify a functional relationship between the explanatory variables and the choice of the

individual. I can assume a linear and additively separable function in the attribute of the trip as the following:

$$V_j = \beta' x_j$$

where β' is a vector of parameters associated with the vector x_j of explanatory variables. Then the consumer's probability of choosing j can be expressed as:

$$P(j/C) = P[(\beta' x_j + \varepsilon_j) > (\beta' x_k + \varepsilon_k)], \forall k \in C$$

The last expression states that the probability of choosing j from choice set *C* equals the probability that the observed utility of opting for *j* plus its random error is greater than the observed utility of opting for k plus its random error. It is clear that the econometric objective will be to find the best estimates of parameters associated with the explanatory variables, and specifying the distribution of error terms will determine the probabilistic choice model, e.g., Multinomial Logit (MNL), Nested Logit (NL),and Mixed Logit (ML).

The most common model is the MNL which assumes that each of the error terms is Type I extreme value distributed. Under this assumption, the probability of choosing "j" becomes:

$$P(j) = \frac{e^{Vj}}{\sum_{k \in C} e^{Vk}}$$

This model contains a structural limitation due to the assumption of independence from irrelevant alternatives (IIA). This assumption states that the relative odds of two options are independent of the attributes or even of the existence of a third option (McFadden, 1980). This implies that the probability of choosing one trip will not be altered because of the existence of other trip alternatives or the characteristics of those trip alternatives.

The sort of decision addressed by this study is unlikely to meet the assumption of IIA. This study required that the individual choose either one trip (where trip characteristics varied in their levels of the four attributes) or not to take a trip at all. The inclusion of the "no trip" option makes the choice process more realistic (Haaijer *et al.*, 2001). In real life the visitor values some

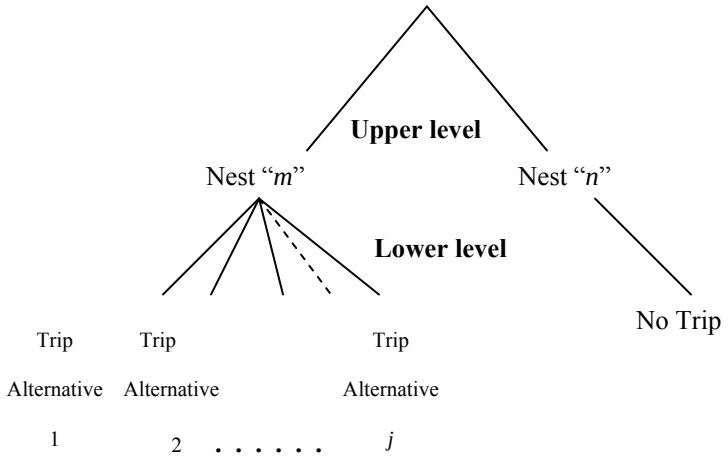
attributes more than others; so it is likely that the level of the most appreciated attribute in the individual choice set can influence the decision of the visitor to take or not take a trip. A consequence of the relationship between available trip alternatives and the "no trip" choice, is that the error terms of the choices are not independent. In addition, the heterogeneity in preferences for attributes invalidates the assumption of identically-distributed error terms. To overcome the restrictive IIA assumption, I pursue the approach followed by Baskaran *et al.* (2007) and use both nested and mixed logit models in our analysis. In the next paragraphs I explain these two methods in detail.

Nested Logit

Many analysts propose the use of a nested logit model because it clusters like alternatives into nests in a way to create a hierarchical structure of choices. Error terms within nest alternatives are correlated while alternatives of different nests have uncorrelated error terms (Ben-Akiva and Lerman, 1985; in: Silberhorn *et al.*, 2006; and, Train, 2009). It is possible to find several applications in the field of transportation, logistic and market issues (see: Train, 1980; Bhat, 1997; Knapp *et al.,* 2001; Kannan and Wright, 1991; Chintagunta, 1993; Chintagunta and Vilcassim, 1998; Guadagni and Little, 1998; Chib *et al.*, 2004; in: Silberhorn *et al.,* 2006). The literature on valuation of environmental goods and services has several studies where this model is applied (see: Blamey *et al.*, 2000; Bennett *et al.*, 2004; Othman *et al.*, 2004; Windle and Rolfe, 2005; Mogas *et al.*, 2006; in Baskaran *et al.,* 2007).

In this study, I apply the nested structure diagrammed in Figure II.1.,below.

Figure II.1. Decision Tree



This tree structure is said to have a degenerate partition, as is common in many applications, because one of the partitions presents only one alternative. Under this structure the choice probability P_{jm} of an alternative "*j*" in the nest "*m*" is the product of the marginal choice probability P_m for nest "m" (in the upper level) and $P_{j/m}$ — that is, the probability of choosing "*j*" conditional on choosing the nest "*m*" (in the lower level). Decision levels are connected by the inclusive values (IV), or the index of expected maximum utility. These values link the level of decisions, assuming that the attributes of the set of alternatives within a nest influence in certain way the choice between nests (Hensher *et al.*, 2005).

Following Silberhorn *et al.* (2006), the random utility U_{jm} of alternative *jm* is the sum of a marginal utility of component U_m from the upper level and the conditional component $U_{j/m}$ from the lower level. This is:

$$U_{jm} = U_m + U_{j/m} = (V_m + \varepsilon_m) + (V_{j/m} + \varepsilon_{j/m})$$

where the random terms of the utility (ε_m and $\varepsilon_{j/m}$) are independent and identically independently distributed (i.i.d) extreme-value with scale parameter μ_m. The composite error

terms e_{jm} are distributed extreme-value with scale parameter λ_m (Ben-Akiva and Lerman, 1985; Hunt, 2000; in: Silberhorn *et al.*, 2006). These scale parameters (μ_m and λ_m) are useful in accounting for the differences in variances due to non-observables or ignored components of the utility. The parameter associated with the inclusive values (IV) is equal to the ratio of the scale parameter of the upper level (λ_m) to the scale parameter of the lower level (μ_m), a ratio that must be in the interval (1,0) due to the condition $\lambda_m < \mu_m$. This condition makes sense if I consider that the upper level has more variance than the lower level (scale parameters are inversely proportional to the variance) because, in addition to its own variance, the upper level includes the components of variances of the lower level. Moreover, meeting this condition keeps the model coherent with the utility maximization assumption (Hensher *et al.*, 2005).

Mixed Logit

The mixed logit model overcomes the limitations of standard logit by allowing for variation in preferences, unrestricted substitution patterns, and correlation in unobserved factors over time (Train, 2009). The last characteristic is particularly important for this research in that the data set contains observations in which each respondent faced four-choice sets. Handling this data as cross-sectional data, that is, assuming independence among choices done by the same individual, is not appropriate and could result in bias standard errors (Ortuzar and Willumsen, 2001; in: Hess and Rose, 2009). In these cases, Train (2009) shows that the mixed logit allows for correlations in unobserved utility over repeated choices by each individual.

According to Revelt and Train (1998), the utility that individual *n* gets from choosing alternative *j* in period *t* is: $U_{njt} = \beta'_n x_{njt} + \varepsilon_{njt}$ where x_{njt} is a vector of observed variables. The term; β_n is a coefficient vector that is unobserved for each individual and varies in the population with density $f(\beta_n / \theta)$, where θ is the true parameters of this distribution, and, ε_{njt} is an unobserved random term identically and independently distributed extreme value Type 1. The

coefficient vector of a mixed logit can be expressed as $\beta_n = b + \eta_n$ where b is the population mean and η_n is the stochastic deviation representing the individual's preferences relative to the average preferences in the population. Then the utility function becomes $U_{njt} = b' x_{njt} + \eta'_n x_{njt} + \varepsilon_{njt}$. The stochastic portion of the utility ($\eta'_n x_{njt} + \varepsilon_{njt}$) is in general correlated over alternatives and time due to the common influence of η_n. Thus the model allows explicit correlation in unobserved utility over repeated choices by each respondent. Further, it incorporates unexplained preference heterogeneity through the random terms in distributions of parameters (Hess and Rose, 2009).

The unconditional choice probability of the individual *n* choosing *i* in period *t* is:

$P_{nit}(\theta) = \int L_{nit}(\beta_n) f(\beta_n / \theta) d\beta_n$ where : $L_{nit}(\beta_n) = \dfrac{e^{\beta'_n x_{nit}}}{\sum_j e^{\beta'_n x_{njt}}}$. This last term is the standard logit probability conditional on the vector of parameters β_n. As the coefficient vector varies in the population, the probability becomes the integral of $L_{nit}(\beta_n)$ over all possible values of β_n, weighted by the density function of β_n. The estimation of parameters is accomplished through simulation maximizing the log-likelihood function. The maximization requires an assumption about the distributional form of β_n. The most common distributions are normal, lognormal, uniform and triangular (Hensher *et al.*, 2005).

Design of the Choice Experiment

Design of the choice experiment used in my study resulted from a process that included: i) in-depth interviews with several tourism experts (twenty individuals from government,

industry, conservationist organizations, and scientists[5]), and ii) pre-testing of survey formats in an on-line pilot survey to tourists who visited the islands (self-selected tourists who responded to the survey within more than three months of visiting the islands, N=16); and in two pilot surveys at the islands' main airport (Baltra) during May and June 2009 (N= 20 and N=42, respectively).

From interviews I confirmed our initial belief that length of trip and price were key attributes. A surprising and important finding was that congestion was not a critical attribute of the Galapagos experience because managers successfully limit the flow of people through the islands through the permitting and scheduling system. A common theme was that visitors differentiated tours by the depth of exposure to the unique biological and geophysical characteristics of the Galapagos. Thus I focused the choice experiment on characterizing the naturalist experience rather than measures of congestion. Similarly, interviews gave a compelling case that the risk of invasive species is the appropriate measure of ecosystem impact rather than the typical indicators for recreational sites such as quality of hiking trails or recreational amenities.

I revised the survey based on interviewer and respondent comments and responses after each iteration of the pre-tests and pilot surveys. The final version included the four attributes and levels depicted on Table II.1. I included the option "no trip" to mirror the actual choices available (Haaijer *et al.*, 2001).

The payment vehicle was the purchase of the trip package excluding airfare. In addition to the choice experiment section, the survey included questions concerning: i) characteristics of the current trip; ii) level of satisfaction with tour guide services and visit to the national park; iii)

[5] Tour companies included were tour operators of Galapagos and Provincial Chamber of Tourism. All naturist guides were members of Guides Associations. The NGOs included World Wildlife Fund, The Nature Conservancy, and Conservation International. Managers were the Park Director of the National Park Official, Chief of Tourism Department, and Tourism Consultant. Researchers included academics from the Galapagos campus of the University San Francisco de Quito and both the Planning Director and the Chief of Social Sciences of the Charles Darwin Foundation.

attitudinal characteristics and opinions of respondents; and iv) socio-demographic characteristics of respondents.

Table II.1. Attributes and levels of the choice experiment

Attributes	Levels
1. Type of tour: recreation and learning experiences available on the tour.	**Overview:** provides an overview of the most famous sites around the archipelago. The guides will not elaborate on individual species. **In depth** : comprises an in-depth visit to all of the most famous sites of the archipelago. These visits will include educational commentary by the guides that describe the evolutionary processes of the islands.
2. Length of tour: number of nights spent touring the islands.	**Short trips:** 5 nights or fewer. **Long trips:** 7 nights or more.
3. Level of protection against invasive species: There are three possible levels of invasive species protection related to the scale of tourism operations.	**High protection (Small scale tourism)--** boats that carry no more than 40 passengers allowed. High value, low volume model that minimizes ecological impacts. **Medium protection (Status quo tourism)--** a mix of medium size boats (40 to 100 passengers) and smaller boats (up to 40 passengers). Medium flow volume model that poses manageable challenges to the isolation of the archipelago. **Low protection (Large scale tourism)--** approximately 90% of all boats would carry over 100 passengers. High volume model that constantly opens new windows for invasive species.
4. Trip cost for within the islands: includes transport (no airfares), accommodation, food /drinks/tips and entrance fee.	The trip **price options per person** are: US$1,000; $3,000; $5,000, and $7,000.

Taking in consideration this basic design, I decided to apply two designs of choice experiment. I then can compare the results using each design as a type of treatment.

The first design included four attributes with their corresponding levels (11 levels): type of tour, length of trip, level of protection against invasive species, and costs. The attributes and their corresponding levels were combined to form different trip alternatives to be presented to the respondents. The full factorial of this design is 192 possible combinations, considering as an extra attribute a blocking attribute that clusters alternatives in blocks (or choice set of alternatives). As it was not practical to have such a large number of alternatives on the survey to be answered by visitors, I selected a fractional factorial design as suggested by Louviere *et al.* (2000). This technique involved the selection of a particular subset of profiles, or samples, from a complete factorial so that the particular effects of interest can be estimated as efficiently as possible (here I ignored the potential interactions). With the use of SAS software, I drew a fractional factorial design of 14 alternatives, which I reduced to 13 after I eliminated the least credible and potentially dominant alternatives. These alternatives were arranged in four alternative sets using a blocking technique suggested in Hensher *et al.* (2005). Each set included an opt-out alternative so that interviewees had the possibility to decide not to go on a trip if they preferred this to the alternatives presented in the set (Huyber, 2003).

The second design considered three attributes (type of tour, length of trip, and costs) with their corresponding levels. These were combined to form different trip alternatives to be presented to respondents. The full factorial of this design was 64 possible combinations, considering as an extra attribute a blocking attribute that clusters the alternative in blocks. As I did for design 1, I used SAS software to draw a fractional factorial design of 13 alternatives, reduced to 12, and these alternatives were assembled in four sets; each set including an opt-out alternative. This design included a contingent stated valuation section just after the choice sets. The stated valuation question was a double bounded bidding format, asking the willingness to pay the entrance fee to the Galapagos Park with a reminder that this fee is used to support the conservation and resource management of the islands.

Figure II.2 presents examples trip alternatives presented to the respondents for both designs.

Figure II.2. Examples of choices sets presented to tourists.

A. Design 1

Characteristics	Package A	Package B	Package C	Decline to take a trip
Tour type	In depth (Following Darwin)	In depth (Following Darwin)	Overview (Highlights of Galapagos)	Under these circumstances I would not travel
Length of trip	Long 7 nights or more	Short 5 nights or less	Short 5 nights or less	
Level of protection against invasive species	Low protection (Large scale tourism)	Medium protection (Status quo tourism)	High protection (Small scale tourism)	
Cost of the trip	$ 7,000 per person	$ 5,000 per person	US$ 3,000 per person	
On my next trip, I would choose:	☐	☐	☐	☐

B. Design 2

Characteristics	Package G	Package H	Package I	Decline to take a trip
Tour type	In depth (Following Darwin)	Overview (Highlights of Galapagos)	In depth (Following Darwin)	Under these circumstances I would not travel
Length of trip	Short 5 nights or less	Long 7 nights or more	Short 5 nights or less	
Cost of the trip	$ 7,000 per person	$ 5,000 per person	US$ 3,000 per person	
On my next trip, I would choose:	☐	☐	☐	☐

Data Collection

Next I describe the experiment and the data-gathering procedures. The choice sets for both designs were arranged in four different sequences and randomly assigned to a respondent to

control for bias due to the order of appearance of the sets[6]. The whole questionnaire for both designs took an average of 20 minutes. In addition to the choice experiment section, the survey included questions concerning i) characteristics of the current trip; ii) level of satisfaction with the guide services and the visits to the national park; iii) the visitor's perception about agglomeration; iv) the attitudinal characteristics and opinion of respondents; and v) the socio demographic characteristic of the individual. All survey materials were approved by the Institutional Review Board of the University of Massachusetts Amherst[7].

The surveys[8] were administered by a team of interviewers during June and July 2009. I selected interviewers from a pool of eight applicants, all of whom were bilingual (English-Spanish) and had completed at least undergraduate studies. The selected interviewers were trained in a six-hour-workshop on how to apply the surveys, including a clinic to practice application of the survey. Additionally, interviewers took the on-line training on protection of human research subjects. Interviews were performed in the airport's lobby area just outside the security filter, in the economy class embarking zone, and in the VIP embarking zone. Interviewers approached potential respondents in these areas and screened them based on three criteria: i) if they were finishing their trip to the Galapagos Islands, ii) if they visited the islands as tourists, iii) if they had traveled around the islands on a cruise boat, and iv) if they were foreign visitors. The respondent sample included only foreign visitors because of their importance as a market segment of to the industry revenues. Foreigners represent around 81% of visitors and that 84% of revenue from tourism industry are earned by tourism boats (Epler, 2007).

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[6] The choice sets appeared randomly during the survey in four sequences. We tested for sample differences among the no-choice option done in these four arrangements. The null hypothesis states that the decision to choose "not to take a trip" in each choice set is independent from the four different sequences in which they appeared:
Ho: the categorical variables choice "not to take a trip" and order of appearance are independent.
The statistic to test the null hypothesis is Pearson chi2. Results of this test for choice set 1,2, 3 and 4 were 1.87 (0.6), 4.9 (0.17), 1.0 (0.8), 1.1 (0.78) respectively (probabilities in parentheses). All these results fail to reject the null hypothesis that the decision to choose "not to take a trip" is independent from the order of appearance of the choice set.

[7] See appendix 1.

[8] Appendix 2 shows both questionnaires administered.

That I chose to interview visitors who are finishing their trip to the islands involves the risk of self selection bias in that elicitation of individual's preferences took place after they had made their decision to come to the islands. However as similar studies on tourism show (e.g., Brau and Cao, 2006), these visitors are well informed about the product subject of this study,

Interviewers handed participants a card with a printed explanation of the attributes and levels of the different trip alternatives, then waited a few minutes to allow the respondent to read the information. The interviewers highlighted the main points of the explanation and asked if the respondent had questions; if so, they answered the questions, and if not, they continued with the interview.

At the end of the interview process, for Design 1, I had administered 300 interviews (Sample 1). For Design 2 I had administered 297 interviews (Sample 2). Completed surveys for Designs 1 and 2 generated samples of 252 and 251 individuals, respectively. The rest of the surveys are incomplete or questionnaires from those who declined participation[9]. The refusal rate for Sample 1 is 11% and for Sample 2 is 11.7%[10], which are rates similar to that reported by Naidoo and Adamowicz (2005). A comprehensive summary of responses on both surveys as well as an aggregation of both can be seen in Appendix 3.

[9] Persons who declined participation are those who, although they met screening criteria, decided not go further than the consent form. Respondents who did not complete the questionnaires did so in most cases because their flights were about to take off or they were required to move from the lobby to the embarking zones.

[10] We tested if the difference in sample proportions was statistically different from zero. The null hypothesis is Ho: $proportion_{sample1} - proportion_{sample2} = 0$. The z-value is 0.1717 p(z)=0.86. This result fail to reject Ho. This means the proportions of incomplete questionnaires or declines on both samples are not statistically different.

CHAPTER III

SETTING INCENTIVES TO MANAGE TOURISM IN THE GALAPAGOS ISLANDS: A CHOICE EXPERIMENT APPROACH

Introduction

The Galapagos Islands are emblematic of the unique flora and fauna that have evolved in isolation. Tourism, once seen as a route to balance pressure for economic development with conservation, may in fact be accelerating the loss of biodiversity. In addition to converting natural areas to recreational amenities, tourism can introduce non-native species into a previously isolated or minimally disturbed area, the effect of which can be substantial. The introduction of non-native species has been responsible in one-half of all documented extinctions since 1600. Because they evolved in isolation, island ecosystems are particularly vulnerable to non-native invasions. Hawaii, for example, home to 25,000 endemic species, has the highest rate of extinction per square mile on Earth.

Resource managers are thus faced with balancing an often greatly-needed revenue from tourism against the risks of invasion by non-native species. What is lacking is high quality information to assist in making decisions regarding these trade-offs. This study contributes to the discussion of managing tourism in the Galapagos Islands by providing quantitative data on tourist preferences and on potential impacts on park revenues due to price discrimination. Our data come from the 300 choice experiments conducted in the summer of 2009, described in chapter II.

Choice Model

I assume that in deciding to make a trip (or not) to the Galapagos, an individual chooses among several trip alternatives that the market offers. To understand such decision-making, I use a random utility model to predict the trip chosen from attributes of alternative trips. The model

assumes a utility function with systematic and random components. The systematic component and random component of the utility function are linear and additively separable. Furthermore, I assume the systematic component (*V*) is linear and additively separable in the attributes of the trip and that the random component (ε) is distributed logistically. The probability that an individual picks alternative *j* over all alternatives *k* in the choice set *C* is written as:

$$P(j \mid C) = \Pr[U_j > U_k] = \Pr[(V_j + \varepsilon_j) > (V_k + \varepsilon_k)] = P[(\beta' x_j + \varepsilon_j) > (\beta' x_k + \varepsilon_k)], \forall k \in C$$

Our decision to include the "no trip" option to improve the saliency of the experiment comes at the expense of a likely violation of the assumption of Independence of Irrelevant Alternatives (McFadden, 1980). Furthermore the design of our data set includes multiple responses by each individual which could be difficult to handle with a multinomial logit model.

Thus I estimated two models: i) nested logit and ii) mixed logit.

The nested logit imposes a hierarchical structure to the decision in which the error terms are correlated within a nest alternative but independent across nests (Ben-Akiva and Lerman, 1985; Train, 2003; Othman *et al.*, 2004). In this context, the first nest is the decision to take a trip or not. The "no trip" branch is degenerative (Hensher *et al.*, 2005) while the "take trip" branch contains the alternatives.

Under the nested structure the probability of picking alternative *j* in the nest "take trip" (P_j) is the product of the marginal probability of taking a trip (P_{trip}) and the conditional probability of choosing *j* ($P_{j|trip}$, the probability of picking option *j* conditional on taking a trip). Decision levels are connected by the inclusive values (IV), or the index of expected maximum utility (Hensher *et al.*, 2005).

If the decision is to take a trip, then the random utility of alternative *j* (U_j) is the sum of the marginal utility from the upper level (in our discrete case, this is the difference in utility

between the two alternatives of the first branch ($U_{trip} - U_{notrip}$) and the utility of the alternative *j*, conditional on taking a trip ($U_{j|trip}$):

$$U_j = (U_{trip} - U_{notrip}) + (U_{j|trip})$$

The random terms of the utility (ε_{trip} and $\varepsilon_{j|trip}$) are independent and identically distributed with scale parameter μ_{trip}. The composite error terms $e_{j,trip}$ have a scale parameter λ_{trip} (Henscher *et al.*, 2005; Silberhorn *et al.*, 2006). These scale parameters (μ_{trip} and λ_{trip}) account for differences in variances due to non-observable or unconsidered components of utility. The parameter associated with the inclusive values (IV) is equal to the ratio of the scale parameter of the upper level (λ_{trip}) to the scale parameter of the lower level (μ_{trip}). This ratio must be in the interval [1,0) due to the condition $\lambda_{trip} < \mu_{trip}$ and to be consistent with the utility maximization assumption (Hensher *et al,.* 2005).

Because the branch "no trip" is degenerative, the expression for the expected utility simplifies to the constant term:

$$U_{notrip,i} = V_{notrip,i} + \varepsilon_{notrip,i} = \beta' x_{notrip,i} + \varepsilon_{notrip,i} = \beta_0 + \varepsilon_{notrip,i}$$

In practice, researchers often assume independence among choices made by the same individual, an assumption that could result in biased standard errors (Ortuzar and Willumsen, 2001). I depart from this approach and utilize a mixed logit model which allows for variation in preferences, unrestricted substitution patterns, and correlation in unobserved factors over the time. This last characteristic makes the mixed logit capable of accommodating correlations in unobserved utility over repeated choices by each individual (Train, 2009).

In the context of the mixed logit, the utility that individual *n* gets from choosing alternative *j* in period *t* is $U_{njt} = \beta'_n x_{njt} + \varepsilon_{njt}$ where x_{njt} is a vector of observed variables; β_n is a coefficient vector, unobserved for each individual and varying in the population with density

$f(\beta_n / \theta)$ where θ is the true parameter of this distribution (Revelt and Train, 1998), and, ε_{njt} is an unobserved random term identically and independently distributed extreme value Type 1. The coefficient vector of a mixed logit can be expressed as $\beta_n = b + \eta_n$ where *b* is the population mean and η_n is the stochastic deviation representing the individual's preferences relative to average tastes in the population. The utility function then becomes $U_{njt} = b' x_{njt} + \eta'_n x_{njt} + \varepsilon_{njt}$. The stochastic portion of the utility, $\eta'_n x_{njt} + \varepsilon_{njt}$, is in general correlated over alternatives and time due to the common influence of η_n. Thus the mixed logit model explicitly allows correlation in unobserved utility over repeated choices by each respondent. Second, it incorporates unexplained preference heterogeneity through random terms in the distributions of parameters (Hess and Rose, 2009).

The unconditional choice probability of the individual *n* choosing *i* in period *t* is $P_{nit}(\theta) = \int L_{nit}(\beta_n) f(\beta_n / \theta) d\beta_n$ where $L_{nit}(\beta_n) = \frac{e^{\beta'_n x_{nit}}}{\sum_j e^{\beta'_n x_{njt}}}$. This last term is the standard logit probability conditional to the vector of parameters β_n. As the coefficient vector varies in the population, the probability becomes the integral of $L_{nit}(\beta_n)$ over all possible values of β_n weighted by the density function of β_n. Estimation of the parameters is through simulation maximizing the log-likelihood function which requires an assumption about the distributional form of β_n (the most common distributions are normal, lognormal, uniform, and triangular (Hensher *et al.*, 2005).

The simple mixed logit allows for heterogeneity in preferences but does not explain the source of variation. To model the heterogeneity in preferences I estimate a mixed logit that includes individual's socio-demographic and attitudinal-opinion variables interacted with the

attributes included in the previous models as suggested by Revelt and Train (1998), Baskaran *et al.* (2007), and Hess and Rose (2009).

The marginal willingness to pay is calculated (per Haab and McConnell, 2003) as:

$$MWTP = (e^{\frac{\hat{\beta}_{attribute}}{\hat{\beta}_{\text{cost}}}} - 1).$$

The vector of trip attributes (x_i) and the expected sign of the coefficient on these attributes are in Table III.2. This table also shows the inclusive value variables from the nested logit model and the interaction variables for estimating the mixed logit model with interactions.

Table III.2. Variables used in the estimations

Variable	Description	Exp. sign or value	Rand. Parame-ter[(a)]
SHORT	Length of the trip short (5 days or fewer). SHORT=1 if the trip is short. Zero, otherwise.	<0	No
INDEPTH	In-depth learning experience from your trip. INDEPTH=1 if experience is in-depth. Zero, otherwise.	>0	Yes (Normal)
LOW_PROTECTION	Low level of protection against invasive species. LOW_PROTECTION=1 if level of protection is low. Zero, otherwise.	<0	No
HIGH_PROTECTION	High level of protection against invasive species. HIGH_PROTECTION=1 if level of protection is high. Zero, otherwise.	>0	No
LN_COST	Natural logarithm of the cost of the trip.	<0	No
CONSTANT_NO_TRIP	Constant parameter of opt-out option. CONSTANT_NO_TRIP=1 if the respondent declines to take a trip. Zero, otherwise.	?	Yes (Normal)
NO_TRIP	Inclusive value[(b)] for no trip branch (this value is normalized to 1).	1 (fixed value)	N/A
TRIP	Inclusive value[(b)] for trip branch.	(0,1)	N/A
NATIONALITY_INDEPTH:	Interaction of type of tour in-depth and the country of origin of the individual. NATIONALITY_INDEPTH=1, if the individual is from North-America (USA or Canada) and has chosen an in-depth trip. NATIONALITY_INDEPTH=0, if the individual is from another country and has chosen an in-depth trip.	?	Yes (Normal)
EXPENSES_LN_COST	Interaction of the natural logarithm of attribute price and the expenses (in US$) incurred during the individual's current trip.	?	No
LOCAL_EXPENSES_SHORT	Interaction of length of tour short and local expenses (in US$) incurred by individual	?	No
HOBBY_SHORT	Interaction of length of tour short and the variable hobby. HOBBY_SHORT= 1, if the person has an outdoor activity as main activity during free time and has chosen a short trip. HOBBY_SHORT= 0, if the person does not have an outdoor activity as main activity during free time and has chosen a short trip.	?	No
EDUCATION_LN_COST	Interaction of the natural logarithm of attribute price and the level of education. EDUCATION_LN_COST>0, if individual's education is at level of graduate or professional school. EDUCATION_LN_COST=0, If individual's education is at a level lower than graduate or professional school.	?	No

[(a)] In parenthesis the type of distribution assumed for the random parameter included in the mixed logit model.
[(b)] The IV values are relevant to the nested logit model.

Statistical Results

Table III.3 presents the results of three models: the nested logit, the simple the mixed logit (ML-S), and the mixed logit with interactions to individual characteristics (ML-I). Results of the estimations are consistent across models. The coefficients of all variables are significant at the 99% level and they have the expected sign. As a whole, these models are statistically significant and explain a substantial amount of the variation. Both models explain about 90% of the variation based on empirical approximation suggested by Domencich and McFadden (1975). The coefficient of inclusive value corresponding to the nest containing trip alternatives satisfies the global utility maximization rule (Hensher *et al*., 2005). The mean coefficients and standard deviations for random coefficients in the mixed logit models are reported together with their standard errors. Standard deviations for each of the random coefficients representing the heterogeneity of individual' preferences relative to the average taste in the population are significant at 99% of confidence with the expected signs. That the standard deviation for the coefficient on the type of trip (INDEPTH) is larger than its point estimate for its mean coefficient suggests a negative relationship for a certain segment of visitors. This result means that approximately 17% of respondents prefer an overview trip (base scenario) over an in-depth trip.

In summary, the typical respondent prefers a long trip over a short trip, a high level of protection over low protection, and a lower price, all else being constant. Although the typical preference is for an in-depth trip over an overview, the mixed logit reveals that there is heterogeneity in these preferences. This heterogeneity is important for resource managers because the implication is he demand for short trips

Table III.3. Estimation results

Variable	Nested Logit Model Coefficient[a]		Mixed Logit Model Coefficient[a]		Mixed Logit with Interactions Coefficient[a]	
SHORT	-0.5263	**	-0.7368	**	-0.8827	**
	(0.1407)		(0.1254)		(0.2748)	
INDEPTH	0.9007	**	1.1591	**	0.9507	**
	(0.1707)		[b] (0.1627)		(0.23300	
St. Dev. INDEPTH	N/A		1.2323	**	N/A	
			(0.1842)			
LOW_PROTECTION	-1.8012	**	-1.9597	**	-2.2864	**
	(0.1606)		(0.1640)		(0.2339)	
HIGH_PROTECTION	1.0831	**	1.4349	**	1.7601	**
	(0.1778)		(0.1424)		(0.2005)	
LN_COST	-0.8775	**	-1.1415	**	-1.5719	**
	(0.1314)		(0.1103)		(0.1666)	
CONSTANT_NO_TRIP	-5.6245	**	-9.6426	**	-11.8484	**
	(0.5860)		[b] (0.9240)		(1.2272)	
St. Dev. CONST_NO_TRIP	N/A		2.1981	**	2.4230	**
			(0.2276)		(0.3117)	
IV Values						
NOTRIP (Fixed)	1.0000		N/A		N/A	
TRIP	0.7755	**	N/A		N/A	
	0.1021[b]					
Interactions with Socio Economic variables						
NATIONALITY_INDEPTH	N/A		N/A		1.0630	**
					(0.2729)	
St. Dev. NATIONALITY. INDEPTH	N/A		N/A		1.3411	**
					(0.2945)	
EXPENSES_LN_COST	N/A		N/A		0.000079	**
					(0.000018)	
LOCAL_EXPENSES_SHORT	N/A		N/A		-0.0002	
					(0.0006)	
HOBBY_SHORT	N/A		N/A		-0.3545	
					(0.2591)	
EDUCATION_LN_COST	N/A		N/A		-0.1775	**
					(0.0580)	
Model Statistics						
Number of Observations	4301		4301		2839[c]	
Log L	-1253.3518		-1172.396		-718.843	
LR Chi^2	379.4103	**	3389.631	**	2347.488	**
Pseudo R^2	0.4990		0.5911		0.6203	

Note: ** denote significance at 1% level.
(a) Standard errors in parenthesis.
(b) Using the Wald-test, I reject the null hypothesis that IV is different from one (z=-2.199; p=0.01).
(c): The number of observations is reduced because not individuals provided all socioeconomic information.

Interacting individual characteristics and trip attributes in the mixed logit provides some insight into the source of heterogeneity in preferences (Revelt and Train, 1998; Baskaran *et al.*, 2007; Hess and Rose, 2009). Preliminary analysis suggested that those respondents who prefer a long and in-depth trip were more likely to have some post-graduate education (61% versus 50%), were more likely to fall into the highest income bracket (67% versus 41% had an annual income greater than $100K), and were less likely to be time constrained (33% were retired versus 19%). The last column in Table III.3 reports coefficients for interactions with attributes of the trip with individual characteristics including: nationality, education, total dollars spent on trip, amount spent in the local economy, and hobbies. I allow for random coefficients for the alternative specific constant for no trip and the interaction between nationality and in-depth tour. The model is significant as a whole and explains a substantial part of the variation. The main sources of heterogeneity in preferences appear to be in nationality, total dollars spent on trip (which may be a proxy for income), and education.

To calculate marginal willingness to pay (MWTP), I designate a base case as a trip that is long, provides an overview, and provides the current level of protection (results in Table III.4). The MWTP are similar across all models; thus I focus our discussion on the more conservative results of the mixed logit simple. Of first-order interest is the MWTP for a change in level of protection from invasive species relative to the current level reflected in the base case. On average, the Galapagos tourist would be willing to pay at least 1.9 times the cost of the base case for a higher level of protection (1.94 to 3.33, CI), and the implicit WTP to move to a higher level of protection is at least $1,927. Conversely, reducing the level of protection leads to a loss in welfare of approximately 82% of the value of the base case (-89% to -74%, CI). The difference in magnitude of the effect is worthy of additional exploration. It could be a result of an under-appreciation of implications of the low-protection scenario. I found that 94% of the respondents rated the quality of their visit to Galapagos between 8 to 10 on a 10-point Likert scale. Perhaps respondents felt that the islands could sustain “large scale” tourism with minimal impact.

The mean marginal willingness to pay for an in-depth trip is 1.79 times (1.18 to 2.58, CI) more than the cost of the overview provided in the base case. The MWTP of the mixed logit with interaction for the variable that interacts in-depth and nationality show that North-American tourists are willing to pay 3.2 times more than an overview trip, while other nationality tourists are willing to pay only 0.9 times more than the price paid for an overview experience. The typical loss in welfare from shortening the length of the trip relative to the base case is 47% of the cost of the long trip in the base case (-59% to -35%, CI). These values could be leveraged by tourism managers, a topic I turn to in the next section.

Table III.4. Marginal willingness to pay per individual

	Nested Logit Model				Mixed Logit Model				Mixed Logit Model with Interactions			
Variable	MWTP[(a)]		Lower	Upper	MWTP[(a)]		Lower	Upper	MWTP[(a)]		Lower	Upper
SHORT	-0.446	**	-0.593	-0.273	-0.474	**	-0.592	-0.352	-0.456	**	-0.641	-0.221
	(0.082)				(0.060)				(0.108)			
INDEPTH[(c)]	1.819	**	1.164	2.616	1.790	**	1.175	2.582	N/A		N/A	N/A
	(0.371)				(0.360)							
INDEPTH-OTHER[(b)]	N/A		N/A	N/A	N/A		N/A	N/A	0.976	**	0.474	1.585
									(0.286)			
INDEPTH-NA[(c)]	N/A		N/A	N/A	N/A		N/A	N/A	3.239	**	2.016	4.982
									(0.764)			
LOW_PROT	-0.870	**	-0.947	-0.782	-0.819	**	-0.890	-0.737	-0.799	**	-0.885	-0.704
	(0.042)				(0.040)				(0.05)			
HIGH_PROT	2.475	**	1.704	-0.947	2.543	**	1.927	3.330	2.499	**	1.856	3.316
	(0.453)				(0.360)				(0.374)			

Notes: ** denote significance at the 1% level.* denotes significance at the 5% level.
Confidence intervals at 95% of confidence were calculated using the Krinsky-Robb method as it is described in Hole A.R., (2007) and included 10K draws from a multivariate normal distribution. Calculation of the cost coefficient uses the sampling average of each variable (current expenses and education).
(a) Standard error in parenthesis.
(b) The MWTP and the intervals for this variable correspond to the individuals that come from countries outside North-America. INDEPTH-NA corresponds to the MWTP for individuals who come from USA or Canada.
(c) Confidence intervals reflect the sampling variability only. Given the parameter for variable INDEPTH, and interacting variable INDEPTH and nationality, estimates of MWTP are equal to the mean of the distribution of the random parameters.

Policy Simulations

An additional goal of our project was to provide information that could be used to manage tourism to the Galapagos Islands. One tool that could be used by managers to reduce the threat of invasive species is a pricing strategy that moves some portion of the demand from short trips to long trips, such as the pricing strategy in use in the Fernando de Noronha (Pernambuco, Brazil). Making the link between responses on the choice survey and future demand for tourism requires many caveats, most notably that respondents are representative of future tourists. While mindful of those limitations, I do believe that I can give a sense of the scale of effects that price discrimination may generate.

I begin by defining the status-quo distribution of the type of trips as the base case, with the level of protection held constant. Current alternatives are: a short trip with an overview (mean price of $1500), a long trip providing an in-depth experience (mean price of $3200), and a long trip with an overview (mean price $3200). These mean prices were calculated from our sample of approximately 500 tourists. Interviews of industry representatives and tourists suggest that the short trip with an in-depth experience is not a feasible option. I use the estimates in Table III.3 for the mixed logit model with interactions. Although estimates are similar among models, the mixed logit with interactions provides insight on differences in demand under alternative pricing strategies when there is heterogeneity in preferences. To reflect the preferences heterogeneity, I take 11,000 random draws using the estimated distribution for the parameters. I use the fitted values to compute indirect utility of the simulated trip packages for each individual present in our data set.

Then I calculate the distribution over trip options conditional on a trip being taken (these proportions are in the column “conditional market share”).

Next I consider two pricing scenarios. The managers might raise the price of the short trip to that of a long trip, or they might penalize a tourist on a short trip by raising the price of a

short trip above that of a long trip. Using the parameter estimates in Table III.3, I calculate the distribution of options and the elasticities of demand for a short trip (see Table III.5). The decreases in tourists taking short trips are 8 percentage points and 10 percentage points corresponding to the pricing scenario. The demand for short trips is elastic (greater than one) but the demand for travel to the islands is very inelastic. This result makes sense because short trips have immediate substitutes on long trips, but a trip to Galapagos has fewer substitutes. The relatively inelastic demand suggests the potential for tourism managers to modify access fees to shift the distribution of length of trips without negatively affecting revenues. These results are consistent with those from other tourist destinations such as the Balearic Islands (Alegre and Pou, 2005) and the coast of Turkey (Gokovali *et al.*, 2006).

The motivation for shifting tourists to longer trips from short trips is to reduce the threat of loss to biodiversity from invasive species. Thus I next considered two alternative levels of protection. The effect of the pricing strategy is reduced under both alternative protection levels relative to the current level of protection because of the natural redistribution below the baseline. Under the high level of protection, the percentage of persons who choose the opt-out option falls to 11% and elasticity falls slightly (0.11 for both pricing strategies). Under the low level of protection, the proportion selecting the "no trip" option jumps to 50%, and demand is more elastic (0.41 and 0.39, respectively).[11] Our interpretation of these opposite effects of the level of protection is that a high level of protection for the uniqueness of the Galapagos differentiates it as a market good. In contrast, this quality is reduced under a low level of protection, thus forcing the archipelago to compete with alternative island destinations.

[11] In both scenarios, the conditional market shares remain constant when the level of protection changes.

Table III.5. Policy simulation

Alternatives	Prices (US$)	Current Level of Protection Market Share	Current Level of Protection Conditional Market Share	Low Level of Protection Market Share	High Level of Protection Market Share
		Base Scenario			
Short-Overiew	1500	0.12	0.16	0.07	0.15
Long-Indepth	3200	0.52	0.68	0.35	0.61
Long-Overview	3200	0.12	0.16	0.08	0.15
No trip		**0.23**	N/A	**0.50**	**0.10**
Weighted Price (US$)	2934.4			2954.8	2924.8
		I. Equal Prices			
Short-Overiew	3200	0.04	0.06	0.03	0.05
Long-Indepth	3200	0.57	0.75	0.37	0.67
Long-Overview	3200	0.14	0.19	0.08	0.17
No trip		**0.25**	N/A	**0.52**	**0.11**
Weighted Price (US$) [(a)]	3200			3200	3200
Price Elasticity (short trips) [(b)]	-1.29			-1.30	-1.28
Price Elasticity (Overall Trips) [(c)]	-0.22			-0.41	-0.11
		II. Short trip's price> Long trip's price			
Short-Overiew	6872	0.02	0.03	0.01	0.02
Long-Indepth	3200	0.58	0.78	0.38	0.69
Long-Overview	3200	0.15	0.19	0.09	0.18
No trip		**0.25**	N/A	**0.52**	**0.11**
Weighted Price (US$) [(a)]	3293			3292	3296
Price Elasticity (short trips) [(b)]	-1.14			-1.11	-1.13
Price Elasticity (Overall Trips) [(c)]	-0.23			-0.39	-0.11

(a) The weighted average of trip prices. The weights used are the conditional market shares of each type of trip.
(b) Elasticity is calculated with respect to the base scenario using the mid-point method. Percentage change of market share for short trip divided by percentage change on short trip price.
(c) Elasticity is calculated with respect to the base scenario using the mid-point method. Percentage change probability to take a trip divided by percentage change on weighted price.

Policy Implications

The magnitude of the willingness to pay for a change in the level of protection provides a strong argument that the threat to the archipelago from invasive species carries a real cost in terms of consumer welfare. Furthermore, it suggests that if tourism degrades the unique attributes of the islands, making them a standard sun-and-sea destination, the islands would lose the

premium they currently command. The relatively inelastic demand suggests the potential for tourism managers to modify access fees to shift the distribution of trip length without negatively affecting revenues.

One way for promoting in-depth tours would be to raise the standards of becoming a naturalist guide and to invest in education of local residents as future naturalist guides. This approach has been advocated by the National Park, scientists, and guides, but has not yet been implemented in a consistent manner (G. Reck, C. Moine, and C. Gernier, personal communication, 2009).

Conclusion

Tourism to the Galapagos has evolved dramatically over the past two decades. Compared to those in previous decades, tourists today are much more likely to have a short stay on the islands and utilize amenities historically associated with more developed locales, such as restaurants and bars. These changes have accelerated immigration and exacerbated pressures on local resources. Of greatest concern to experts on biodiversity, however, is the threat of loss or destruction of biodiversity from invasive species brought about by the substantial increase in the number of individual tourists. This threat remains despite restrictions on the number of tourists permitted on the islands at any one point in time because of the observed industry response in providing shorter but more frequent trips.

I conducted a choice experiment to elicit preferences over four trip attributes: length, depth of experience, level of protection, and price. The survey collected details of the respondent's current visit, alternatives considered, socio-demographics, and attitudes and beliefs, providing a quantitative description of use value for the Galapagos. Three results stand out. First, the typical respondent has a mean marginal WTP for an in-depth experience over an overview experience of $ 1,790 (mixed logit simple result), and managers could use this result to leverage a certification program for naturalist guides. A small group of individuals (4% of the

whole sample) prefer an overview trip over an in-depth experience, a result that substantiates a concern voiced in interviews with conservation experts who suggest that there is some level of misinformation about the islands that attracts a type of visitor who is little interested in the environmental significance of the park. Educational messages that detail lesser known risks of environmental tourism and promote in-depth trips could be beneficial to the Galapagos National Park.

Second, the mean marginal WTP for a high level of protection over the current level is $2,543 (mixed logit simple results). Clearly, the islands' biodiversity is valued by visitors, a fact that should be reflected in planning economic development. Last, demand elasticity suggests that the Galapagos are a reasonable setting to implement a price discrimination strategy to shift tourists from short trips to long trips. Shifting visitors from short trips to long trips decreases the risk of invasive species while maintaining revenues from tourism. Thus this policy approach is significantly more likely to be feasible than other approaches that decrease the volume of tourism.

CHAPTER IV

EFFECTS OF COMMODITY SPECIFICATION ON THE WILLINGNESS TO PAY FOR A TRIP TO GALAPAGOS: A CHOICE EXPERIMENT APPROACH

Introduction

The increasing popularity of the Galapagos Islands has provoked an extraordinary growth in the number of visitors — from fewer than 10,000 visitors when tourism started on the late 1970s to 173,420 during 2008 (www.galapagospark.org). According to park directors and managers, scientists, and researchers, this expansion of tourism and the increase in immigration to the islands raises the risk of invasive species, threatening the long term conservation of the islands' pristine ecosystem. Galapagos experts are also concerned about the change over time in type of visitor arriving on the islands — from informed nature-loving visitors early on to adventure tourists looking for extreme experience, a group that these experts believe represents approximately 60% of today's visitors to the islands. Changes in visitor number and in visitor type stress any management of tourism activity in the Galapagos making control over the number of visitors inefficient and increasing the pressure to relax restrictions because of local economic gain from tourist activities in the islands (F. Cruz and C. Grenier, personal communication, 2009).

This study's objective was to assess how a decision to take a trip to the Galapagos is affected by a description of the archipelago — that is, by the information provided about the destination itself. According to NOAA panel guidelines, providing an accurate description of the program or good to be described is critical to guarantee the reliability of the results of stated based valuation methods such as the contingent valuation.

In an extensive review of contingent valuation studies, Schläpfer (2008) finds evidence supporting his hypothesis that survey respondents are able to form consistent preferences about

unfamiliar goods if the choice context provides them only with reliable informative and contextual cues that can be easily processed by the individual, e.g., acceptance of the product by similar individuals, or position taken on the product by well-known political parties.

Results of previous studies on information bias in contingent valuation suggest that the amount, the type, and the quality of information provided to individuals in a state preference survey have effects on valuation estimates. Samples *et al.* (1986) provides a good example of the effect of dosing the information about the good being valued from a general (low dose) to a very particular (high dose) descriptions of the goods, performing a series of experiments to assess the willingness to pay (WTP) to preserve different type of animals. In each treatment, participants are provided different levels of information about the animal's physical characteristics and its endangered status. The participant is asked to split an amount of money among three types of animals, to establish a preservation fund for each animal. Four groups of participants are arranged to perform the task: the first group split the money without knowing the animals (just x, y, and z), the second group knew the basic characteristics of the animals, the third group knew the endangered status, and the fourth group had full information (animals, animal characteristics, and endangered status). The authors conclude that there is a positive relationship between the amount contributed to preserve these animals and the information provided.

Other literature focuses on the quality of information and its different influence on individual contributions whether the type of good being valued is a public or a private good. Ajzen *et al.* (1996) show the positive effect on contributions to public good due to differences in the information presented. They compare the WTP assigned by college students for a private good (personal noise filter) and public goods (theater on campus). The experiment involved comparing two different descriptions of the products, one containing strong arguments and the other weak arguments about the product benefit. Descriptions also contain altruistic or individualistic motivational orientations to try to influence the WTP given by the respondent. Ajzen *et al.* conclude that quality of information can influence the willingness to pay, especially

under conditions of high personal relevance, and assert that subtle contextual clues (such as altruistic orientations) can affect WTP estimates under conditions of low personal relevance.

Another study highlighting the role of information on WTP estimation is Bergstrom *et al.* (1989) which shows how perspective and relative information have effects on personal contributions to a public good. The authors set up a contingent market with automatic information feedback in which the participants are asked to contribute for improving their access to a recreational public good (river). At the beginning of the experiment, the participant states her WTP through a bidding routine and provides her income. The participant is then shown her bid as a percentage of her income (termed perspective information) and she is given the opportunity to change her bid. Next, relative expenditure information is presented and the experimenters show the participant a list of typical annual expenditures and the importance of these items relative to her income. The respondent's bid is ranked within this list, and there is again the possibility for the respondent to modify her bid. Finally, the experimenters provide information about project costs to improve access to the river, the respondent is informed that if everyone contributes the same as she has bid, total contributions will not be enough to cover the project's cost, and she is again given the opportunity to change her bid. Outcomes suggest that providing perspective and relative expenditure information about the amount of WTP stated and cost information about the commodity being valued results in only small, non-significant increases on individual bids but produces a significant bid increase in the aggregate. Bergstrom *et al.* (1989) state that this effect is desirable in that the information enhances the individual's understanding of the valuation task.

In my study, observations collected from the two surveys generated two samples which were used independently to estimate two sets of parameters — on the decision to visit the islands and on the marginal willingness to pay (MWTP) for selected attributes —which I later compared.

Sample 1, the base case, is a mixed logit model[12] based on 300 choice experiments in which respondents chose among a set of trip alternatives resulting from the combination of four attributes: length of the trip, type of tour, level of protection against invasive species, and price. Sample 2, or the alternative case, is a mixed logit model based on 297 choice experiments in which respondents chose among a set of trip alternatives resulting from combinations of the same attributes but excluded the attribute of protection against invasive species. I then analyze the differences in model parameters and MWTP using these two samples and the pooled samples. The difference between the two designs allows us to describe the conservation challenges faced in the Galapagos as a particular case. Because these results can be compared to the general case, they are of benefit for other nature tourism destinations facing similar management problems.

This chapter is organized in three sections. The next section presents our methodology, comprising a detailed description of how the choice experiment was designed; the application of the experiment, and the statistical methods to test our working hypothesis. The second section presents estimation results; and the last section formulates some conclusions.

Methodology

Choice Experiment Design

Survey respondents were asked to choose a trip to the archipelago after receiving a brief description of the islands or receiving a description of the islands as an environmental commodity. The study performs a sensitivity analysis of parameter estimates and the marginal willingness to pay, calculated for attributes of a typical trip to the islands. This analysis is based on comparing results from two versions of contingent valuation choice experiment surveys administered to tourists as they finished their trip to the Galapagos. The difference between the two experiments' designs is in the description of a typical trip to the islands: one design portrays the archipelago as a market commodity (a standard holiday destination) while the other portrays

[12] This model is presented in the previous chapter.

the archipelago as an environmental commodity, highlighting the unique and vulnerable biodiversity of the islands as well as the challenges that tourism poses to conservation of the islands' character.

Figure IV.1shows part of the explanation provided to respondents of Design 1. This text was part of a two-page leaflet given to respondents of Design 1, explaining the attributes and the corresponding levels of each attribute in detail. This text was not included in the leaflet given to respondents of Design 2. The interviewers allowed time for respondents of both designs to read the leaflet and ask for any further explanation[13].

Figure IV.1. Example of characteristics

Excerpt characteristics explanation (Design 1)

... 3. Level of protection against invasive species; which have come to be regarded as posing the greatest risk to native biodiversity on the islands. Invasive species are those species introduced from outside the Galapagos that have a demonstrated negative impact on the ecosystems of the islands. The increasing ease of international travel and popularity of Galapagos as a tourist destination means that tourism itself, once seen purely as a positive benefit to conservation of Galapagos, is also part of the problem due to the increasing flow of people and goods that tourism generates.

There are three possible levels of invasive species protection:

High protection (Small scale tourism)--- just boats that carry up to 40 tourists would be allowed to operate. This is a high value, low volume model that minimizes ecological impacts.

Medium protection (Status quo tourism)--- currently there is a mix of medium size boats that carry over 40 up to 100 tourists at a time and smaller boats that carry up to 40 passengers. About 45.6 % of tourists stay on large boats and 54.4% stay on small boats. This is a medium flow volume model that poses some manageable challenges to the isolation of the archipelago to new invasive species.

Low protection (Large scale tourism)--- approximately 90% of all boats would carry over 100 tourists at a time. Visitors can experience the Galapagos and enjoy amenities found on traditional commercial cruises. This is a high volume model that constantly opens new windows for invasive species...

[13] Answers to potential questions were scripted to guarantee consistency among interviewers.

The four attributes and their corresponding levels of Design 1were combined to form different trip alternatives to be presented to respondents. The full factorial of this design is 192 possible combinations, considering a blocking attribute that clusters the alternative in blocks (or choice set of alternatives) as an extra attribute. As it was not practical to present survey respondents with such a large number of alternatives, I selected a fractional factorial design as suggested by Louviere *et al.* (2000),using SAS software to draw a fractional factorial design of 14 alternatives; which was reduced to 13 after I eliminated the least credible and potentially dominant alternatives. These 13 alternatives were arranged in four set of alternatives using a blocking technique suggested in Hensher *et al*. (2005). Each set included an opt-out alternative, giving the respondent the possibility of deciding not to take a trip (if preferred to the alternatives presented in the set) and making the choice situation more real (Huyber, 2003).

Design 2 combined three attributes and eight levels to form different trip alternatives for the survey. The full factorial of this design was 64 possible combinations, considering a blocking attribute that clusters the alternative in blocks as an extra attribute. As for Design 1, I used SAS software to draw a fractional factorial design of 13 alternatives, reduced to 12, and these 12 alternatives were assemble in four sets; each set included an opt-out alternative. In both designs, each choice set appeared randomly during the interview to avoid bias due to their order of appearance.

Design 1 and Design 2 surveys were administered by the same team of interviewers (3 persons) during June and July 2009. Each interviewer had an equal number of interviews with the two designs. The same interview screening criteria were followed; both designs were administered in interviews that lasted about 20 minutes. By the end of the interview process, I had performed 300 interviews of Design 1 and 297 interviews of Design 2 . Completed surveys generated samples of 252 individuals (Sample 1) for Design 1 and 251 individuals (Sample 2) for Design 2.

The remaining surveys are incomplete questionnaires or from individuals who declined participation. Individuals who declined participation met screening criteria but decided to go no further than the consent form. In most cases, those respondents who did not complete the questionnaires did so because their flights were about to take off or they were required to move from the lobby to the embarking zones. The refusal rate for Sample 1 is 11% and for Sample 2 is 11.7%[14], similar to that reported by Naidoo and Adamowicz (2005).[15]

To check if both samples were drawn from the same population, I compared a select set of socio-economic numerical and categorical variables (income, age, total trip expenditures, local expenditures, nationality, and education, among others). Results suggest that there are not significant differences between samples' means of numerical variables at 5% level of significance and that there is independence between categorical variables and the samples (see Table IV.1 below).

[14] We tested if the difference of the sample proportion was statistical different from zero. The null hypothesis is Ho: $proportion_{sample1} - proportion_{sample2} = 0$. The z-value is 0.1717 p(z)=0.86 . This result fails to reject Ho. This means the proportions of incomplete questionnaires or rejection on both samples are not statistically different.

[15] Naidoo and Adamowicz (2005) had a 13% rate of incomplete surveys from 1,000 surveys handed out in the departure lounge of the international airport in Uganda.

Table IV.1. Summary statistics

Numerical variables	Sample 1 Obs.	Sample 1 Mean[(a)]	Sample 2 Obs.	Sample 2 Mean[(a)]	p-value[(b)]
Stay of length (days)	256	6.7	245	6.6	0.496
		(2.7)		(2.1)	
Expenses per person (US$)	204	3,122.3	192	3,286.3	0.485
		(1,907.4)		(2,711.9)	
Expenses in local towns per person (US$)	229	118.9	230	139.0	0.397
		(175.2)		(313.9)	
Number of trip done in the last five year for nature appreciation	248	6.3	239	5.0	0.128
		(11.2)		(7.2)	
Number of family members	248	1.2	240	1.3	0.293
		(1.1)		(1.1)	
Age	246	46.9	238	47.4	0.721
		(15.9)		(16.8)	

Categorical variables		Sample 1 Freq.	Sample 1 Percent	Sample 2 Freq.	Sample 2 Percent	p-value [(c)]
Gender	Female	136	54.6	122	50.8	0.416
	Male	113	45.4	118	49.2	
	Total	249	100	240	100	
Do you belong to a conservation organization?	No	151	60.6	143	59.6	0.854
	Yes	98	39.4	97	40.4	
	Total	249	100	240	100	

…Continued: Table IV.1. Summary statistics

Categorical variables		Sample 1 Freq.	Sample 1 Percent	Sample 2 Freq.	Sample 2 Percent	p-value [(c)]
Nationality	North America	134	54.0	134	55.8	0.677
	Other	114	45.9	106	44.2	
	Total	248	100	240	100	
Education	Grad. /professional school	126	50.8	125	52.3	0.532
	Other	122	49.2	114	47.7	
	Total	248	100	239	100	
Occupation	Employed full-time	109	43.8	95	39.8	0.289
	Other	140	56.2	144	60.3	
	Total	249	100	239	100	
Income	US$ 76,000 or more	140	62.5	142	65.4	0.317
	Less than US$ 76,000	84	37.5	75	34.6	
	Total	224	100	217	100	

(a) Standard deviations in parenthesis.
(b) Probability of the t-student. It tests if the difference of the sample means are statistical different from zero. The null hypothesis is Ho: $mean_{sample1} - mean_{sample2} = 0$. For all numerical variables, the test statistic is significant 1% level.
(c) Probability of the Fisher Exact statistic. It tests the null hypothesis Ho: *The categorical variable and sample are independen*t. For all categorical variables, the Fisher Exact value is significant 1% level. Note that some categorical variables are collapsed in two categories to fit in this summary table.

Statistical Methods

To estimate the individuals' choices I use a mixed logit model. This model overcomes the limitations of standard multinomial logit by relaxing the assumption of independence from irrelevant alternatives (IIA), by allowing for variation in preferences, by unrestricted substitution patterns, and by correlation in unobserved factors over time (Train, 2009).

The objective is to see if using different samples the mixed logit model delivers the same estimates of remaining attributes. To compare these estimates, I follow two strategies: 1) to calculate the Swait-Louviere test, and 2) to compare the marginal WTP estimated from the two samples. These approaches are used by other authors to evaluate the impact on estimated parameters of multinomial logit and mixed logit models, due to the modification or elimination of an attribute in a choice experiment application (e.g., Blamey *et al.,* 1998; Rolfe *et al.,* 2002; Hanley *et al.,*2005; and Kragt and Bennett, 2010).

Test 1

The Swait-Louviere test evaluates the next hypothesis: $H_0 : \beta_1 = \beta_2$ and $\lambda_1 = \lambda_2$.

where β_n (n=1,2) are the vector of parameters for the mixed logit model using Sample 1 and Sample 2, assuming that the two samples collected with each survey share the same population parameters. Additionally, λ_n (n=1,2) represents the scale factor of each sample, conditional on the both samples share the same scale factor.[16] To perform parameter comparisons on multinomial logit models, Swait and Louviere (1993) suggest first ruling out differences between scale factors: because a scale factor is inversely related to variance of the error distribution corresponding to each data set. If one data set has more variance than the other, the Chow test (or other standard statistical test) could mistakenly conclude that the parameter vector differs between data sets, when in fact they are equivalent.

The appropriate test to use is a two-stage variant of the Chow test which verifies if β_1 and β_2 are equal while allowing scale factors to differ between data sets. If I reject the hypothesis that vector parameters between samples are equal, I are rejecting as well the proposition that they share the same scale factor. If I cannot reject this hypothesis, I should impose the condition that λ_1 and λ_2 are equal and test for differences between parameter vectors (Swait and Louviere, 1993).

To apply this test we should calculate the next statistic:

$LR = -2(LL_{pooled} - (LL_1 + LL_2))$ where LL_{pooled} is the model's log-likelihood where I pool the data sets collected from the two versions of the survey. LL_1 and LL_2 are the model's log-likelihood using Sample 1 and Sample 2, respectively. In order to pool the two data sets, I have rescaled the Sample 1 data set by the estimated relative scale parameter. To estimate the relative

[16] Scale factor is one of the parameters characterizing the extreme value Type 1 distribution which is assumed for multinomial logit models.

scale parameter, I follow the procedure described by Swait and Louviere (1993), normalizing the scale parameter of Sample 2 (λ_2) to one, so that λ_1 becomes a relative scale parameter with respect to λ_2. I multiply the vector of independent variables of Sample 1 by λ_1 and concatenate vertically with the vector of independent variables of Sample 2. To keep the balance on the pooled data between the independent variables of both samples, I assigned to Sample 2 trip description the current level of protection. We then proceed to a grid search within a range of values for λ_1 that will maximize the log-likelihood of the pooled model, a procedure implemented by programming on Limdep NLOGIT 4.0.

The *LR* statistic is asymptotically chi-squared distributed with (K+1) degrees of freedom, where K is the number of independent variables in the pooled model. The extra degree of freedom appears because I allow λ_1 to vary. If the result rejects the null hypothesis that $\beta_1 = \beta_2$, then we must reject the hypothesis $\lambda_1 = \lambda_2$. Otherwise, I should proceed with a second likelihood ratio test that assumes scale factors are equal on both models that is, by testing the rescaled pooled model against the un-rescaled pooled model using the next test:

$LR_\lambda = -2(LL_{pooled\ un-rescaled} - LL_{pooled})$ where $LL_{pooled\ un-rescaled}$ is the log-likelihood of the pooled model's not being rescaled or both data sets sharing the same scale factor. The LR_λ statistic is asymptotically chi-square distributed with one degree of freedom. If I fail to reject the null hypothesis (parameters and scale factors for both samples are equal), then I can assert that parameters and scale factors are not statistically different.

Test 2

Another approach used to evaluate the effect of changes in survey design is to compare the marginal willingness to pay (MWTP) between samples (e.g., Rolfe *et al*., 2002; Hanley *et al*., 2005; Kragt and Bennett, 2010). The MWTP is the ratio of the parameter for the selected attribute with the cost parameter. This normalization of estimates by the marginal utility of

income (cost) measures the consumer's value of a one-unit change in the corresponding variable. This procedure is straightforward when we assume a linear utility function (Haab and McConnell, 2002). To evaluate the significance of differences between estimated MWTP, I calculate confidence intervals at 95% level of confidence. I can build these intervals applying Krisky-Robb, which comprises a large number of draws from a multivariate normal distribution with means and covariance given by the coefficients and covariance matrix estimated on our models. MWTP can then be calculated from each draw and the confidence intervals are identified from the tails of the MWTP distribution (Hole, 2007).

Estimation and Results

The choice data from both surveys were analyzed in Limdep Nlogit 4.0. In order to address the issue of multiple observations per respondent, these mixed logit models were estimated in a panel data format that allows controlling for unobserved heterogeneity across the choices made by the same individual[17]. This is an important feature as both samples in this study include an experiment design in which four choices are made by a single individual.

The study estimates two specifications of a Mixed Logit model. The first specification, Mixed Logit Simple (ML-S) for both samples, included only the trip attributes as independent variables. The second specification, Mixed Logit with Interactions (ML-I) for both samples, includes not only the trip's attributes as variables but also includes variables resulting from interacting trip attributes with respondent's socio-economic characteristics. To decide which parameters would be random, I adopted the same format of both mixed logit models (simple and with interactions) presented in the previous chapter[18]. For ML-S, I set as random parameter the

[17] I used the function PDS that allows to specify a panel data. In this case the command is PDS=4.
[18] In that chapter I performed several regressions to find out the variables that produced the best results in a random format. The results were judged based on individual significance and performing likelihood test to compare between models.

coefficient for the alternative specific constant "no trip" and the attribute tour type in-depth and imposed a normal distribution on both parameters. For ML-I, Iset as random parameters the coefficient for the alternative specific constant "no trip" and the interaction variable tour type in-depth and nationality, both assumed to be distributed normally. The only modeling difference between samples is that Sample 2's models do not include the attribute "protection against invasive species" as independent variable. For a detailed explanation of the variables included in the models, refer to Table III.2 in the previous chapter.

Table IV.2 presents the estimates for Sample 1 and 2 that are common between models.

Table IV.2. Estimation results

Part A. Simple Mixed Logit Model

Variable	Mixed Logit Model Sample 1 Coefficient [(a)]		Mixed Logit Model Sample 2 Coefficient [(a)]		Mixed Logit Model Pooled and Re-scaled Coefficient [(a)]	
SHORT	-0.7368	**	-0.5269	**	-0.5826	**
	(0.1254)		(0.0893)		(0.0689)	
INDEPTH	1.1591	**	0.8863	**	0.9466	**
	(0.1627)		(0.1436)		(0.1014)	
St. Dev. INDEPTH	1.2323		1.3744	**	1.2937	**
	(0.1842)		(0.1623)		(0.1185)	
LOW_PROTECTION	-1.9597	**	N/A		-1.8230	**
	(0.1640)				(0.1476)	
HIGH_PROTECTION	1.4349	**	N/A		1.2365	**
	(0.1424)				(0.1050)	
LN_COST	-1.1415	**	-0.9319	**	-0.4731	**
	(0.1103)		(0.0848)		(0.0506)	
CONSTANT_NO_TRIP	-9.6426	**	-8.1912	**	-4.1854	**
	(0.9240)		(0.6894)		(0.4275)	
St. Dev. CONST_NO_TRIP	2.1981	**	1.9620	**	1.5812	**
	(0.2276)		(0.2339)		(0.1312)	
Model Statistics						
Number of Observations	4301		3514		7815	
Log L	-1172.396		-1083.056		-2257.410	
LR Chi^2	3389.631	**	2648.862	**	7357.157	**
Pseudo R^2	0.5911		0.5501		0.6197	

Note: ** denote significance at 1% level.
(a) Standard errors in parenthesis.

Table IV.2. Estimation results

Part B. Mixed Logit Model with Interactions

Variable	Mixed Logit with Interactions Sample 1 Coefficient[(a)]		Mixed Logit with Interactions Sample 2 Coefficient[(a)]		Mixed Logit with Interactions Pooled and re-scaled Coefficient[(a)]	
SHORT	-0.8827	**	-0.7962	**	-0.7604	**
	(0.2748)		(0.2025)		(0.1529)	
INDEPTH	0.9507	**	0.9386	**	0.8068	**
	(0.2330)		(0.1740)		(0.1276)	
St. Dev. INDEPTH	N/A		N/A		N/A	
LOW_PROTECTION	-2.2864	**	N/A		-1.9949	**
	(0.2339)				(0.1953)	
HIGH_PROTECTION	1.7601	**	N/A		1.3536	**
	(0.2005)				(0.1320)	
LN_COST	-1.5719	**	-1.3376	**	-1.3595	**
	(0.1666)		(0.1280)		(0.0965)	
CONSTANT_NO_TRIP	-11.8484	**	-9.2528	**	-10.1258	**
	(1.2272)		(0.8883)		(0.7104)	
St. Dev. CONST_NO_TRIP	2.4230	**	2.0735	**	2.1003	**
	(0.3117)		(0.3252)		(0.2010)	
Interactions with Socio Economic variables						
NATIONALITY_INDEPTH	1.0630	**	0.5232	*	0.7742	**
	(0.2729)		(0.2334)		(0.1748)	
St. Dev. NATIONALITY. _INDEPTH	1.3411	**	0.9909	**	1.1732	**
	(0.2945)		(0.2657)		(0.1903)	
EXPENSES_LN_COST	0.000079	**	0.000087	**	0.000076	**
	(0.000018)		(0.000018)		(0.0000011)	
LOCAL_EXPENSES_SHORT	-0.0002		0.0001		-0.00009	
	(0.0006)		(0.0003)		(0.00027)	
HOBBY_SHORT	-0.3545		0.4191		0.0404	
	(0.2591)		(0.2310)		(0.1671)	
EDUCATION_LN_COST	-0.1775	**	-0.0118		-0.0916	*
	(0.0580)		(0.0549)		(0.0365)	
Model Statistics						
Number of Observations	2839		2324		5163	
Log L	-718.8425		-688.3964		-1420.733	
LR Chi^2	2347.488	**	2127.875	**	5002.519	**
Pseudo R^2	0.6203		0. 6072		0.6378	

Note: ** denote significance at 1% level. * denote significance at 5% level.
(a) Standard errors in parenthesis.

The modeled results of both samples are consistent — that is, they have the same signs and the same level of significance. In the ML-I model, I observe some inconsistency on signs on the variables that are not statistically significant. Additionally, the variable EDUCATION_LN_COST is not significant for Sample 2.

If I compare each attribute one by one, I can see in the ML-S that for Sample 2 the effect on utility of an INDEPTH trip to the islands is smaller than for Sample 1. It is also possible to observe that the standard deviation of this attribute on Sample 2 (INDEPTH is considered a random parameter) is higher than that for Sample 1, suggesting that Sample 2 has greater heterogeneity with respect to preference on type of tour than does Sample 1. In the ML-I, the same observation about the magnitude of the parameter apply, but in this model the INDEPTH's coefficient is not random.

With respect to the attribute length of trip, the SHORT parameter observed for Sample 2 is smaller in absolute terms than its coefficient for Sample 1 in both models. This could suggest that in shifting from a long trip to a short trip, the trip's utility is less affected for Sample 2 than for Sample 1. Similar conclusions can be drawn on both models comparing the constant terms of both samples, with the observation that the standard deviations of the constant term for Sample 2 are smaller than those estimated for Sample 1.

The estimated coefficient for the interaction variable nationality and type of tours (NATIONALITY_INDEPTH) for Sample 2 is smaller than that estimated for Sample 1, suggesting that the effect on utility of in-depth trips for North-American individuals in Sample 2 is smaller than the same effect on individuals in Sample 1.

For the case of variable LN_COST in the ML-S, the estimate for Sample 2, in absolute terms, is smaller than the estimate for Sample 1. In analyzing LN_COST in the ML-I, I observe that interactions of this attribute with the variables expenses on current trip (EXPENSES_LN_COST) and education (EDUCATION_LN_COST), the magnitude of the parameters estimated in Sample 2 are also smaller than those in Sample 1. These results suggest

that the negative effect over utility of changes in price for Sample 2 is smaller than the same effect for Sample 1.

Next I calculate the Swait-Louviere test, to check if the population parameter on both model are similar. First I estimated the relative scale parameter (λ_1) using a grid search interval [0.01 , 1.9] (Swait and Louviere, 1993). Grid search results for both models (ML-S and ML-I) are given in Figure IV.2. The value of λ_1 that maximizes the log-likelihood of ML-S and ML-S is 1.05, the same value in both models. With the relative scale parameter I can pool both samples and estimate the models. I rescaled Sample 1, multiplying the independent variables by λ_1, then concatenated the data sets vertically and estimated the mixed logit models. The estimates of these pooled-rescaled models are shown on Table IV.2 (last column on right). If I observe the attribute variables on both models and the interaction variables on ML-I, I see that results are consistent on both samples in terms of signs and significance. With regard to magnitude, the attribute estimates for the ML-S are between the estimates of both samples. For the ML-I most of the estimates' magnitudes are between the estimates for Sample 1 and Sample 2, except for the variables SHORT and INDEPTH[19].

We then calculate the Swait-Louviere test using log-likelihood of the pooled-scaled models:

Mixed Logit Simple

LR(9) = -2 (-2257.41-(-1172.396-1083.056))

= 3.92

Mixed Logit with Interactions

LR(14) = -2 (-1420.73-(-718.84-688.40))

= 26.98

[19] Other authors (Hanley *et al.,* 2005 and Blamey *et al.,* 1998) also report some estimate results from scaled and pooled model in which magnitudes are not between those estimated for the sub-samples.

The degrees of freedom in this case for the mixed logit simple are 9, and the chi-square critical value at 5% of significance is 16.919. That the value of the test for the ML-S is smaller than the critical value means that I fail to reject the hypothesis that the population parameters on both samples are equivalent. I must then calculate the second part of the test in which I compare likelihoods of the pooled scaled model and of the pooled un-scaled model: $LR(1) = -2\ (-2258.41 - (-2257.41)) = 2.92$. The value of this last test is smaller than the critical value (3.84) at 1 degree of freedom. Thus, I fail to reject both hypotheses that parameters and scale factors are equivalent. This suggests that elimination of the attribute protection against invasive species has not affected values of the coefficients that remain in the model.

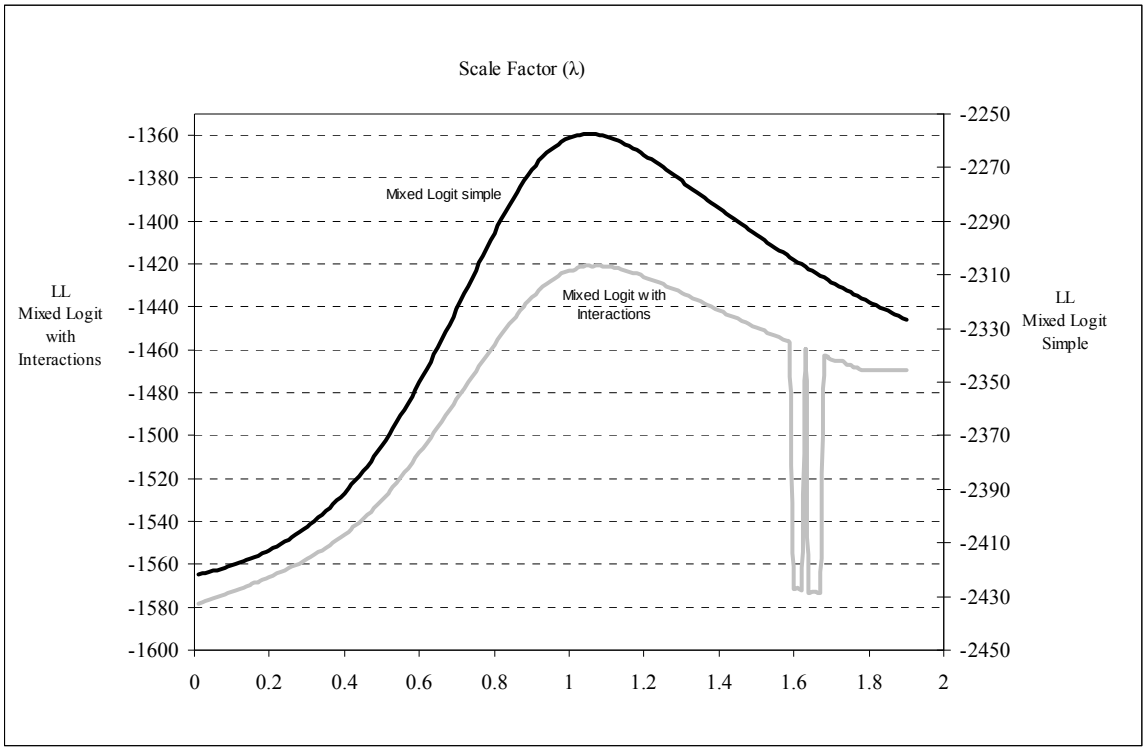
For the mixed logit with interactions model, the degrees of freedom are 14 and the critical value is 23.685 (at 5% level of significance). In this case, the value calculated for the first part of the Swait-Louviere test is greater than the critical value, so for this model, I can reject the null hypothesis that the population parameters on both samples are equivalent and can also reject the hypothesis that scale factors of both samples are similar. This suggests that for the mixed logit with interactions model, elimination of the attribute protection against invasive species (that provided information about the fragility of the island ecosystem and the role of tourism) has modified the relative values of the coefficients. Even after accounting for differences between scale factors of the two samples, the differences of the coefficients between samples remain significant.

The fact that the relative scale parameter is greater than one in the mixed logit model with interactions means that the scale factor of Sample 1 is greater than the scale factor of Sample 2. Because scale factor is inversely related to the variance of sample error distribution, this implies that choice data for Sample 1 is less "noisy" than choice data for Sample 2.

The contradictory results between models as to equivalence of the estimated parameters for both samples could have its origin in the fact that the ML-I considers more information about the individual, a fact that better explains the heterogeneity of individual preferences. In

considering socio economic features of individuals in the two samples, this suggests that exclusion of the attribute "protection against invasive species" changes the choice model. Furthermore, exclusion of this attribute makes the decision more uncertain when I consider the individual socio-economic characteristics, as shown in the higher variance of error distribution for Sample 2.

Figure IV.2. Maximum Log-likelihood (LL) at different scale factor (λ_1)



As mentioned in the previous section, another way to check the effects of applying different choice designs is to compare MWTPs and their confidence intervals. Hanley *et al*. (2005) point out that this approach could be more interesting for policy makers since they are, after all, interested in how a visitor's valuation changes with elimination of the attribute protection against invasive species. Results of MWTP for both mixed logit models can be seen in Table IV.3. Results from the two samples look quite similar. At 95% confidence intervals of the attributes, they are overlapping. This means that there are not significant differences among the estimated MWTP for both samples. I expect that the difference in price vector estimate for

Sample 2 compared to that for Sample 1will compensate for changes in the non-price attribute estimates for Sample 2. I also estimated the MWTP for pooled-rescaled mixed logit models and found them to be similar to the MWTP estimated for Sample 1 and Sample 2. The confidence intervals of these models are also overlapping between samples, suggesting no significant differences among the estimated MWTP.

Table IV.3. Marginal willingness to pay per individual

Part A. Using estimates of the Simple Mixed Logit Model

	Sample 1				Sample 2				Pooled and Rescaled			
Variable	MWTP [(a)]		Lower	Upper	MWTP [(a)]		Lower	Upper	MWTP [(a)]		Lower	Upper
SHORT	-0.474	**	-0.592	-0.352	-0.431	**	-0.540	-0.316	-0.281	**	-0.442	-0.099
	(0.06)				(0.06)				(0.09)			
INDEPTH[(b)]	1.790	**	1.175	2.582	1.615	**	0.993	2.395	1.394	**	0.673	2.353
	(0.36)				(0.36)				(0.43)			
LOW_PROT	-0.819	**	-0.890	-0.737	N/A		N/A	N/A	-0.840	**	-0.893	-0.775
	(0.04)											
HIGH_PROT	2.543	**	1.927	3.330	N/A		N/A	N/A	2.508	**	1.930	3.200
	(0.36)											

Notes: ** denote significance at the 1% level.
Confidence intervals, calculated using the Krinsky-Robb method as described in Hole A.R., (2007), included 10,000 draws from a multivariate normal distribution. CI at 95% level of confidence.
(a) Standard error in parenthesis.
(b) MWTP, given that the parameter is equal to the mean of the random parameter distribution. Confidence intervals are for the mean.

Part B. Using estimates of the mixed logit model with interactions

	Sample 1				Sample 2				Pooled and Rescaled			
Variable	MWTP [(a)]		Lower	Upper	MWTP [(a)]		Lower	Upper	MWTP [(a)]		Lower	Upper
SHORT	-0.456	**	-0.641	-0.221	-0.522	**	-0.691	-0.319	-0.476	**	-0.602	-0.329
	(0.108)				(0.096)				(0.071)			
INDEPTH-OTHER[(b)]	0.976	**	0.474	1.585	1.456	**	0.853	2.217	1.008	**	0.660	1.408
	(0.286)				(0.340)				(0.192)			
INDEPTH-NA[(c)]	3.239	**	2.016	4.982	3.073	**	1.846	4.785	2.929	**	2.077	4.003
	(0.764)				(0.758)				(0.499)			
LOW_PROT	-0.799	**	-0.885	-0.704	N/A		N/A	N/A	-0.767	**	-0.842	-0.681
	(0.05)								(0.041)			
HIGH_PROT	2.499	**	1.856	3.316	N/A		N/A	N/A	1.718	**	1.310	2.207
	(0.374)								(0.231)			

Notes: ** denote significance at the 1% level.* denote significance at the 5% level.
Confidence intervals, calculated using the Krinsky-Robb method as it is described in Hole A.R., (2007), included 10,000 draws from a multivariate normal distribution. Calculation of the cost coefficient uses the sampling average of each variable (current expenses and education). CI at 95% level of confidence.
(a) Standard error in parenthesis.
(b) The MWTP and the intervals for this variable correspond to individuals coming from countries outside North-America. INDEPTH-NA corresponds to the MWTP for individual coming from USA or Canada.
(c) Confidence intervals reflect sampling variability only. MWTP, given the parameter for variable interacting INDEPTH and nationality is equal to the mean of the random parameter distribution.

Conclusions

MWTPs estimated in the ML-S model are higher in absolute terms for individuals in Sample 1 (who had access to information concerning protection against invasive species) than MWTPs estimated for individuals in Sample 2 (who were given no information concerning protection against invasive species). This result suggests that including additional information on threats to the islands' conservation increases the premium an individual is willing to pay for a longer trip and an in-depth experience in the islands. After accounting for variations in scale factor, the Swait-Louviere test suggests that estimates in the ML-I model differ statistically. This result is not consistent over all the tests performed. Comparison of the MWTP 95% confidence intervals show there are not significant differences between two samples. Rolfe *et al.* (2002) gets this contradictory result between the Swait-Louviere test and the 95% confidence intervals when he compares parameters and implicit prices of two multinomial logit models that differ in one attribute. He rejects the null hypothesis that the parameter estimates are equivalent, yet all but one implicit price confidence intervals overlap.

The result that exclusion of additional information did not impact MWTP in Sample 2 could be rooted in some degree of visitor loyalty to the destination. Additional information certainly modified the data generation process for this sample, suggesting that the individual decision-making process was different when they did not count in the additional information. Another interesting insight that comes out of this result is the fact that choice decision about length and type of tour cannot be separated from protection against invasive species, which could be interpreted by the visitor as a quality trait of the destination. This is a signal to park directors and managers — that if they want to keep their market presence and increase the value of tourism in the Galapagos, they must keep a high level of conservation and protection measures.

As I could not reject the hypothesis that the MWTP estimated in both models are equivalent, I can assert there is not bias effect due to information availability. This result

provides more reliability to the estimates that came from the base-case model. The consistency in mixed logit estimates and in MWTP between the two samples signals the robustness of the model.

One interesting finding from the Swait-Louviere test is that the relative scale parameter (λ_1) is greater than 1 for the mixed logit with interaction model; implying that choice data for Sample 2 has more random noise than choice data for Sample 1. This suggests that information on invasive species, on the threat that tourism activities poses over long term conservation of the islands, and on quality aspects of island tours helped respondents to build consistent preferences, making their decisions more coherent over the choice sets presented. This result is coherent with a conclusion drawn by Boyle (1989) who points out the importance of refinements in description of the commodity being valued so as to significantly reduce variations in the estimations. This point also underscores the reliability of results from the original base-case model that included all trip attributes.

CHAPTER V

CONCLUSIONS, POLICY INSIGHTS AND FUTURE RESEARCH

Conclusions

The choice experiment methodology provided a powerful tool for understanding the preferences of visitors to the Galapagos Islands and for identifying the key attributes that make this archipelago different from other destinations.

Data collected with a full description of a trip resulted in coherent and robust results from the three estimation models: nested logit, mixed logit, and mixed logit with interactions. The three have a pseudo R^2 of 50%[20]. Additionally, all the attributes estimates on the three models are significant at a 99% level of confidence.

Parameters estimated for the attributes are consistent with our initial expectations and with the standard theory. The estimate of attribute cost is negative, indicating this attribute's decreasing effect on the expected utility of a trip alternative and on the probability of choosing a particular alternative. The coefficient related to a short stay is also negative, representing the loss of utility the visitor faces when choosing a short trip (but which can be compensated for with a smaller cost). These characteristics open opportunities for policy makers to influence the stay-length decision based on total cost of the trip.

The estimate related to trip experience INDEPTH is positive and its MWTP is at least 1.2 times the base scenario price. A positive MWTP for experience INDEPTH is true for at least 96% of the whole sample in the mixed logit with interactions model. This indicates how valuable it is for visitors to be given an education on the biodiversity they are observing. Local guides can act as engaged interpreters and provide added value to the island's biodiversity. Another

[20] According to Hensher et al. (2005) a pseudo R^2 of 0.3 is a decent model fit for a discrete choice model.

interesting result from the mixed logit with interactions model is that nearly 4% have a negative appreciation for an in-depth tour.

Another interesting finding is related to the signs of parameters for the level of protection against invasive species: it is negative for the case of low protection and positive for high protection. The magnitude of the coefficient for low protection (which is higher than the coefficient for high protection), emphasizes the importance to the visitor for keeping protection high for the national park and for avoiding the possibility of the Galapagos becoming merely another standard holiday destination. The rate of MWTP corresponding to this level of the attribute (at least -0.80 for all models estimated) can be interpreted as a discount from the amount the visitor is paying in case the level of protection falls too low. The positive parameter corresponding to a high level of protection indicates the gains of value for the visitor if the level of protection is increased. The MWTP corresponding to this improvement in the level of protection is 2.5 for the three models estimated, an indication that efforts to establish stricter controls against new invasive species could be rewarding in terms of potential tourism revenue. This result provides a quantitative description of the use value of tourists for the unique ecosystem of the Galapagos. Of course, this value does not reflect the total economic value of the archipelago which comprises additional elements such as the bequest, option, and existence values.

A caveat should be raised concerning the results of the level of protection against invasive species. An embedding effect may have occurred between the protection level of the ecosystem and the scale of tourism. If this occurred, it is possible that the respondent's choice reflects the combined preference between protection against invasive species and the scale of the tourism. This potential embedding effect does not influence the results of other attributes to travel. We are reassured that if embedding did occur in some cases, it was limited. I find they are not modified even when we eliminate the attribute protection against invasive species. In fact

when the attribute protection against invasive species was eliminated, the results did not change substantially.

The results presented in this study are conditional on the individual's decision to travel to the Galapagos Islands, and the robustness of results depends on how likely the sample is to be representative of future visitors to the Galapagos. I am confident that our sample is representative of visitors to the islands because there are no major differences among samples collected by Epler in 2006, by Izurieta-Sinay in 2007, and by Viteri Mejia in 2009 (see Appendix 3, Table C).

The results of our market share simulations show policy makers the potential of setting the prices of visiting the islands to affect the length of visitors' stay. By this means, they can achieve a desirable structure of short and long stays without a negative impact on revenue produced by tourism.

This study is different from previous WTP studies in the Galapagos Islands (Machado, 2001; Oleas, 2008) in that it applies a choice experiment methodology with a vehicle of payment that is the total cost of travel within the islands. This last aspect is crucial for analyzing the effect of changing price policies on the overall economy of the islands rather than on entrance fees and park revenue alone.

Policy Insights

The relatively inelastic price demand for a visit to the archipelago suggests a potential for the Galapagos National Park to influence the cost of park access with the aim of reducing the number of visits to the park and to shift the distribution of trip length without negatively affecting park revenues.

That the elasticity of short trips is greater than one suggests that the number of short-trip visitors will decrease if a price increase is applied. This demand characteristic would allow the National Park to establish a price policy that sorts out a visitor who is looking for a standard sun-

and-sea destination while increasing the number of visitors who choose long trips. Those on long trips then have more opportunity to learn about the importance of this protected area.

Given that the current entrance fee charged by the National Park is only US $100 (approximately 3% of the mean expenditure within the islands), the first alternative to change the cost of visiting the islands would be to increase the entrance fee. The National Park could then create a fee scheme that punishes short stays. It is important to note that the entrance fee has not been modified since 1993; the last attempt to modify the entrance fee was in 2008. At that time operators' arguments that the international economic crisis had hurt the tourism industry curtailed the attempt for an increase. The reluctance to increase entrance fees comes from a base broader than just the tourism sector. Several public institutions depend on the entrance fee, and there is the misconception that a fee increase will decrease their total revenues. This research demonstrates the contrary: an increase of fees and a discriminatory price policy can favor socially desirable visits (longer stays and more focused on the islands biodiversity) without compromising the revenues of the tourism industry or public institutions. The National Park should also analyze other mechanisms to influence the costs of visiting the islands, perhaps through other fees or charges to tourist operators, such as the annual per-berth license fee charged to vessels[21].

Any one of these policy changes is going to expand the ability of the National Park to capture the current rent generated by the uniqueness of the ecosystem. Such rent capture could have a positive effect on income distribution, as it will correct a distortion pointed out by Tisdell (2001). The government's failure to extract enough rent from visitors creates incentives for private operators to extract rent for their private gain, producing unwelcome consequences in income distribution.

The high WTP for an in-depth experience supports the efforts of the National Park and the calls made by academics, scientists and guides to keep and to improve the standards for

[21] According to Epler (2006), the highest fee currently charged is $US250 (per year per berth) to category “A” vessels.

becoming a naturalist guide (G. Reck, C. Moine, and C. Gernier, personal communication, 2009). It also suggests that further investments in education for locals as future naturalist guides will keep the revenues from tourism high. Given that a visitor's experience depends on the quality of guidance, and that this characteristic is hard for the consumer to observe, policy makers should find ways to communicate to the visitors which operators in the market can offer an experience of high-quality.

Estimates of WTP for increasing the level of protection and the discount for lowering the level of protection are strong messages that visitors will not tolerate a downgrading in protection of the archipelago. Instead they call for making the protection measures stricter. If the islands become a standard sun-and-sea destination, they would lose the premium currently received due to its unique ecosystem.

The level of information about the islands for potential visitors to Galapagos has proven to be key in decisions to opt for a type of trip that is more beneficial to the long term sustainability of the island — that is, visitors will be more likely to opt for longer trips and with more value added (better interpretation of the ecosystem biodiversity). This is a call for the authorities to coordinate with tourism operators and improve the quality of information provided to potential visitors to the islands.

Future Research

One question that arises from this study of economic valuation of tourism in the Galapagos Islands is, What is the economic value of the total fragile ecosystem? The answer to this question will involve a comprehensive analysis that is not limited to the point of view of tourists and the tourism industry. It will instead involve the participation of individuals from the islands, mainland Ecuador, and international individuals in order to value all aspects of the islands from its amenities to its existence value. Studies on valuing iconic ecosystems such as

the Great Barrier Reef in Australia apply choice experiment methodologies to assess both use and non-use values of the ecosystem (see Rolfe and Windle, 2010).

The visitor's high WTP for trips with an in-depth experience and interpretation of the islands' biodiversity suggests analyzing other strategies to increase the added value of a visit to Galapagos — to explore, for example, the WTP of visitors for certification programs that guarantee that tourism operator practices can both protect the environment and support the local economy.

APPENDICES

APPENDIX 1

CERTIFICATION OF HUMAN SUBJECTS APPROVAL

University of Massachusetts Amherst
108 Research Administration Bldg.
70 Butterfield Terrace
Amherst, MA 01003-9242

Research Compliance
Human Research Protection Office (HRPO)
Telephone: (413) 545-3428
FAX: (413) 577-1728

Certification of Human Subjects Approval

Date: April 21, 2009

To: Cesar Viteri Mejia

From: Priscilla Clarkson, Chair, Social, Behavior & Education

Protocol Title: Valuation of attributes of Galapagos Islands tourism: A discrete choice experiment.
Protocol ID: 2009-0188
Review Type: EXEMPT - NEW
Paragraph ID: 2
Approval Date: 04/21/2009
Expiration Date: 04/20/2012
OGCA #:

This study has been reviewed and approved by the University of Massachusetts Amherst IRB, Federal Wide Assurance # 00003909. Approval is granted with the understanding that investigator(s) are responsible for:

Modifications - All changes to the study (e.g. protocol, recruitment materials, consent form, additional key personnel), must be submitted for approval in e-protocol before instituting the changes. New personnel must have completed CITI training.

Consent forms - A copy of the approved, validated, consent form (with the IRB stamp) must be used to consent each subject. Investigators must retain copies of signed consent documents for six (6) years after close of the grant, or three (3) years if the study is unfunded.

Adverse Event Reporting - Adverse events occurring in the course of the protocol must be reported in e-protocol as soon as possible, but no later than five (5) working days.

Completion Reports - Notify the IRB when your study is complete by submitting a Final Report Form in e-protocol.

Consent form (when applicable) will be stamped and sent in a separate e-mail. Use only IRB approved copies of the consent forms, questionnaires, letters, advertisements etc. in your research.

Please contact the Human Research Protection Office if you have any further questions. Best wishes for a successful project.

APPENDIX 2

SURVEY TREATMENTS

A. Treatment 1

B. Treatment 2

APPENDIX 2

SURVEY TREATMENT 1

VERSION 1

Interviewer.
Make sure you have the following materials before you begin an interview.

Your identification badge.
A complete copy of the survey
The set of trip descriptions on colored card stock
A pen
A copy of the consent form to give to the respondent.
Paper for respondent.

Before an interview, please provide this information.

Date:	
Time:	
Interviewer ID:	
Interview location	_____ VIP lounge ____ Coach class lounge ___ Before the security filter
How was participant selected?	

Good Morning,

My name is: <*Interviewer name*>, I am working on a research project funded by the University of Massachusetts Amherst (in the USA) with the support of LACEEP (the Latin-American and Caribbean Environmental Economics Program). I am conducting a survey of tourists in the Galapagos Islands. May I ask you a few questions?

1. Are you a tourist visiting the Galapagos islands? Yes ☐ No☐

2. During your trip to the Galapagos Islands, where did you spend most of your nights?

On a cruise boat ☐

In a hotel at a local town ☐

Equal time spent on a cruise boat and in a hotel at a local town ☐

<If the tourist answers: "NO" in Q.1, or answers: "In a hotel at a local town" in Q.2, interviewer thanks the person and explain that this survey is applied just to tourists that visited Galapagos by boat. Stop the survey>

To thank you for taking the time to do our survey, you will be entered into a raffle drawing. The top prize is a $100 gift card to the Amazon.com website. There are 4 second prizes as well of $25 gift cards. We expect the odds will be based on the number of participants in the survey. *<If the respondent asks about the odd of winning you can mention they are high (1 in 50) because we are expecting to have 500 participants>***.**
<Interviewer please say: Before we proceed, I'd like to tell you why we are doing this survey. >

We are interested to learn how people value and feel about visiting this protected area.

The information from this survey will be used on a research project of the Department of Resource Economics of the University of Massachusetts Amherst and the results will be submitted to the Galapagos National Park Administration for their use.

All your answers will be kept confidential. The interview lasts about 20 to 30 minutes. At any time you may stop the interview or not answer a specific question.

Are you willing to participate in this interview? Yes ☐ No☐

< If the respondent says YES continue with the interview. Please mention that (at the end of the interview you are going to hand out a copy of the consent form. If the respondent is not willing to participate in the interview please record the reason given for not participating, and also hand out a copy of the consent form.>

<Record here the reason the respondent did not want to participate>

_____

_____

_____

SECTION I

Information about your current visit to the Galapagos National Park

I.1. What was the name of the boat you used to travel around the islands?: _____

I.2. Before your visit, did you consider any other destinations for your vacation instead?

Yes ☐ No ☐ *<If the answer is No, go to I.4.>*

If yes, Where?: _____

I.2.a. Approximately how much did you expect to spend per person in this alternative destination (including lodging, food, entertainment, local transport and tips, please DO NOT include airfare from your home country to the destination)? All prices are listed in US $:

Less than US$ 1,000 ☐

US$ 1,001 to 2,500 ☐

US$ 2,501 to 5,000 ☐

US$ 5,001 to 7,500 ☐

More than US$ 7,500 ☐

I.3. What is the main reason that you chose the Galapagos Islands instead of the alternative destination?:

_____

_____

I.4. How many nights did you spend in the Galapagos islands? : ____ number of nights.

I.4.a. Which of the following factors did you consider when you were deciding how many nights to stay in the Galapagos Islands for this trip? Please indicate all that apply to your decision: *<Check all that apply. If list more than one, ask which was the most important.>*

Factors	**Check all that apply**	**Check the most important**
Cost	☐	☐
Number of places I wanted to visit	☐	☐
The type of tours available in the Galapagos	☐	☐
The total amount of vacation time I have each year	☐	☐
Other (explain): _____	☐	☐

I.4.b. *<If the respondent choose "the type of tours…."*>What were you looking for in a tour package?:

_____

I.5. Beside this trip to the Galapagos, how many additional days do you plan to spend on vacation this year?

_____ (number of days).

I.5.a. How many of those vacation days will you spend traveling away from your home?

_____(number of days).

I.5.b.Was the amount of vacation time you had available an important factor in deciding how long to stay in the Galapagos Islands?

Not a factor ☐

Somewhat of a factor ☐

An important factor ☐

A very important factor ☐

I.6. How many islands did you visit during this trip? : _____

I.6.a. Overall do you feel that the time spent at each island was

Too little time ☐

About the right amount of time ☐

More than enough time ☐

I.7. On average, how many people were in your group when you visited different sites?: _____

I.8. How often did your tour group meet other tour groups at the sites?

Rarely ☐

Occasionally ☐

Often ☐

Always ☐

I.8.a. Do you think that the number of persons with whom you shared the visitor sites was:

Too few ☐

About right ☐

Too many ☐

I.9. Did you have a naturalist guide with you at most of the sites you visited?

Yes ☐ No ☐

I.9.a. Overall, on a scale from 1 to 10 (with 10 being very important), how important do you think it is to have a naturalist guide during the visit?

1	2	3	4	5	6	7	8	9	10
Not important									Very important

I.9.b. <If they answered "yes" *in I.9. ask this question*> Overall, on a scale from 1 to 10 (with 1 being limited knowledge and 10 being in-depth knowledge), how would you evaluate the knowledge of the guides at the Galapagos National Park? :

1	2	3	4	5	6	7	8	9	10
Bad, they had little knowledge about the natural history of the island and its ecology.								The best, they had a deep knowledge about natural history and ecology of the islands.	

I.10. Overall, on a scale from 1 to 10 (with 10 being the best), how would you rate your visit to the Galapagos National Park? :

1	2	3	4	5	6	7	8	9	10
The worst visit									The best visit

<Note: Interviewer - if the respondent answers question I.10 with a "7 " or less, go to I.10.a, otherwise, go to Section 2>

I.10.a. Why did you give a score of <*Score on Q.I.10*> for your visit?:

_____

_____

_____

I.10.b. Which aspects of the park should be improved?:

_____

_____

_____

SECTION 2
Questions about tourism

In the next section I am going to show you different tour packages for the Galapagos Islands. These tour packages vary in the type of tour, length of tour, policies to reduce invasive species and the trip cost for within the islands.

<Hand the respondent the card stock with the descriptions of the attributes and levels. Give the respondent 1 minute to read>.

Let me explain further what I mean by each of these characteristics and how they vary across the different trip options:
<Now, continue with the explanation of the characteristics according with the script that summarizes the detailed explanation.>

1. The type of tour refers to the types of recreation and learning experiences available on the tour. There are two types of tour.

> **Overview (Highlights of Galapagos)**: This experience provides an overview of some of the most famous sites around the archipelago. You will get the flavor of the island and see the most emblematic species and landscapes. You will see the jewels of the island, but the guides will not elaborate on the individual species.
>
> **In depth (Following Darwin):** This experience comprises an in-depth visit to all of the most famous sites of the archipelago. At the end of your trip you will have a deep understanding of the life cycles of many emblematic species. These visits will include educational commentary by the guides that describe the complex evolutionary processes of the islands. The visitor has plenty of time to observe ecological and biological processes such as hunting, feeding, and mating.

2. The length of tour is the number of nights spent touring the islands. There are two trip lengths: **Short** trips, are 5 nights or less. And **long** trips are 7 nights or longer.

3. Level of protection against invasive species; which have come to be regarded as posing the greatest risk to native biodiversity on the islands. Invasive species are those species introduced from outside the Galapagos that have a demonstrated negative impact on the ecosystems of the islands. The increasing ease of international travel and popularity of Galapagos as a tourist destination means that tourism itself, once seen purely as a positive benefit to conservation of Galapagos, is also part of the problem due to the increasing flow of people and goods that tourism generates.

There are three possible levels of invasive species protection:

> **High protection (Small scale tourism)**--- just boats that carry up to 40 tourists would be allowed to operate. This is a high value, low volume model that minimizes ecological impacts.
>
> **Medium protection (Status quo tourism**)--- currently there is a mix of medium size boats that carry over 40 up to 100 tourists at a time and smaller boats that carry up to 40 passengers. About 45.6 % of tourists stay on large boats and 54.4% stay on small boats. This is a medium flow volume model that poses some manageable challenges to the isolation of the archipelago to new invasive species.

Low protection (Large scale tourism)--- approximately 90% of all boats would carry over 100 tourists at a time. Visitors can experience the Galapagos and enjoy amenities found on traditional commercial cruises. This is a high volume model that constantly opens new windows for invasive species.

4. The trip cost for within the islands includes accommodation, full meals, local transportation within the archipelago, entrance fee for conservation and management of the islands, and guide services. It does not include airfare from the mainland to the islands, or airfare from your home country to Ecuador. The trip price options ranges from $1,000 to $7,000 per person

II.1 Do you have any questions? < *Please record if there are or not questions. If yes, please answer the questions*>

Yes ☐ No☐

Now I am going to present to you a series of tour packages. All prices are listed in US $. Please choose one option from each card <*hand the responder the card block according the color of the survey*> **:**

II.2. Each column on the card represents a tour package. Assume you will have the opportunity to make another trip to the Galapagos Islands, all the packages will be similar in terms of quality of tourist services (lodging & food) and guide service. On each card, please choose the package you like the best.
If you are not comfortable choosing one alternative in one table you can choose "**Decline to take a trip**".

Characteristics	Package D	Package E	Package F	Package G	Decline to take a trip
Tour type	In depth (Following Darwin)	Overview (Highlights of Galapagos)	In depth (Following Darwin)	Overview (Highlights of Galapagos)	Under these circumstances I would not travel
Length of trip	Short 5 nights or less	Long 7 nights or more	Long 7 nights or more	Short 5 nights or less	
Level of protection against invasive species	High protection (Small scale tourism)	High protection (Small scale tourism)	Medium protection (Status quo tourism)	Low protection (Large scale tourism)	
Cost of the trip	$ 7,000 per person	$ 5,000 per person	US$ 3,000 per person	$ 1,000 per person	
On my next trip, I would choose:	□	□	□	□	□

II.2.a. Why did you pick that particular package?

_____

_____

II.2.b. Overall, on a scale of 1 to 10 (with 10 being very certain) how certain are you about the choice you just made? <*circle the number*>:

1	2	3	4	5	6	7	8	9	10
Very uncertain									Very certain

Characteristics	Package H	Package I	Package J	Package K	Decline to take a trip
Tour type	Overview (Highlights of Galapagos)	In depth (Following Darwin)	In depth (Following Darwin)	Overview (Highlights of Galapagos)	Under these circumstances I would not travel
Length of trip	Long 7 nights or more	Short 5 nights or less	Short 5 nights or less	Long 7 nights or more	
Level of protection against invasive species	High protection (Small scale tourism)	High protection (Small scale tourism)	Low protection (Large scale tourism)	Medium protection (Status quo tourism)	
Cost of the trip	$ 7,000 per person	$ 5,000 per person	US$ 3,000 per person	US$ 1,000 per person	
On my next trip, I would choose:	□	□	□	□	□

II.2.c. Overall, on a scale of 1 to 10 (with 10 being very certain), how certain are you about the choice you just made? <*circle the number*>:

1	2	3	4	5	6	7	8	9	10
Very uncertain									Very certain

Characteristics	Package L	Package M	Decline to take a trip
Tour type	Overview (Highlights of Galapagos)	Overview (Highlights of Galapagos)	Under these circumstances I would not travel □
Length of trip	Short 5 nights or less	Long 7 nights or more	
Level of protection against invasive species	Medium protection (Status quo tourism)	Low protection (Large scale tourism)	
Cost of the trip	$ 7,000 per person	$ 5,000 per person	
On my next trip, I would choose:	□	□	

II.2.d. Overall, on a scale of 1 to 10 (with 10 being very certain), how certain are you about the choice you just made? <*circle the number*>:

1	2	3	4	5	6	7	8	9	10
Very uncertain									Very certain

Characteristics	Package A	Package B	Package C	Decline to take a trip
Tour type	In depth (Following Darwin)	In depth (Following Darwin)	Overview (Highlights of Galapagos)	Under these circumstances I would not travel
Length of trip	Long 7 nights or more	Short 5 nights or less	Short 5 nights or less	
Level of protection against invasive species	Low protection (Large scale tourism)	Medium protection (Status quo tourism)	High protection (Small scale tourism)	
Cost of the trip	$ 7,000 per person	$ 5,000 per person	US$ 3,000 per person	
On my next trip, I would choose:	□	□	□	□

II.2.e.What factors were important in picking this package?

_____

_____

II.2.f. Overall, on a scale of 1 to 10 (with 10 being very certain), how certain are you about the choice you just made? <*circle the number*>:

1	2	3	4	5	6	7	8	9	10
Very uncertain									Very certain

SECTION 3

Questions on expenditures

III.1. In US $. how much did this vacation in the Galapagos Islands cost per person? Please include the cost of accommodation, all meals, local transportation within the archipelago, entertainment, guide services, tips and gratuities, DO NOT include the entrance fee into the national park, airfare from Ecuador mainland or from your home country)?

US$ _____

<III.1.a. If the respondent can not provide an answer, please ask why?:>

_____

III.2. Did you visit local towns within the Galapagos (i.e. Santa Cruz, San Cristóbal, Isabela)?

Yes ☐ No ☐

III.2.a. If yes, how much do you estimate you spent in the local towns per person?

US$_____

III3. What entrance fee did you pay per person when you entered the Galapagos National Park? :

US$_____

SECTION 4

Questions on <u>people's preferences</u>

In this section, I am going to ask about your preferences of current affairs and your hobbies.

IV.1. In your personal opinion, how important are the following problems for developing countries like Ecuador? <*Please mark with an X accordingly*>.

Problem	**Very Important**	**Important**	**Somewhat Important**	**Not important**	**Don't Know**
a) Fighting crime					
b) Improving public education and health					
c) Protecting the environment and endangered ecosystems					
d) Generating employment					
e) Improving city sanitization					

IV.1.a. Which issue do you think is the most important?: _____

IV.2. In your personal opinion how important are the following global problems? <*Please mark with an X accordingly*>

Problem	**Very Important**	**Important**	**Somewhat important**	**Not important**	**Don't Know**
a) Hunger and poverty around the world					
b) Energy and natural resource prices					
c) Loss of biodiversity and ecosystems from development					
d) Global warming and climate change effects					
e) International crime and drug trafficking.					
f) International terrorism					

IV.2.a. Which one do you think is the most important? : _____

IV.3. People like to spend their free time in a variety of activities. Some examples are: outdoor activities, visiting museums, going shopping or to the movies, etc. Of these activities, which one do you do the most often? Would you say <*list them again*> <*Note: Interviewer mark the activity chosen with "1"*>. Which do you do the second most often? <*Note: Interviewer mark the activity chosen with "2"* >

Activities	**# Rank**
Outdoor activities such as hiking, biking, & swimming.	
Visiting museums and art events	
Going to the movies/ shopping	
Another activity:	

IV.4. In the past five years, how many trips have you taken for the primary purpose of seeing wildlife or enjoying nature that lasted 3 days or more? Please DO NOT include this visit to Galapagos.

_____(number of trips).

IV.5. Do you belong to any environmental or conservation organizations?

Yes ☐ No ☐

SECTION 5

Questions on background information

Before we finish this last section, let me remind you that ALL of your answers will be kept strictly confidential.

V.1. What is your age? _____ (number of years)

V.2. Are you: _____ FEMALE? or _____ MALE?

V.3. What is your nationality?: _____

V.3. a. In which country do you reside?:_____

V.4. Excluding yourself, how many family members live with you? _____ (number of people)

V.4.a. How many of these are under 18 years old? _____ (number)

V.5. What is the highest education level you have completed?

- Junior high ☐
- High school ☐
- Some college or technical school ☐
- Completed college ☐
- Graduate school or professional school ☐

V.6. Would you describe yourself as:

- Formerly employed but now retired ☐
- Employed full-time by someone else ☐
- Employed part-time by someone else ☐
- Self-employed ☐
- Not employed ☐

V.7. Which household income category best fits your household? Income levels per year are listed in US$:

Less than US$ 25,000 ☐

US$ 26,000 to 50.000 ☐

US$ 51,000 to 75,000 ☐

US$ 76,000 to 100,000 ☐

US$ 101,000 to 250,000 ☐

More than US$ 251,000 ☐

V.8. Do you have any concerns or comments about your visit to the Galapagos Islands that you would like to share? Please feel free to write them on this sheet
< Hand them the note paper and a pen. Say to the person she can return the paper when she is done >

*< **REMEMBER**: Hand out a copy of the Consent Form>*

<If she wants to participate in the raffle, we need an email address (or physical address) to contact her in case of winning. Hand out the card to fill out. Tell them that the card with email address will be kept separate from the survey.>

<Finally, say thanks the person for her time and wish her a pleasant trip back home>

<ATTENTION: If the respondent stopped the interview before the survey's end. Please record the reason:
Decline to go on ☐
Plane boarding ☐
Other: _____ ☐>

<OBSERVATIONS *Time survey ended:_____*

As the interviewer, how would you rate the respondent's understanding of the questions? Respondent seemed to understand:
All questions ☐
Most of the questions ☐
Did NOT understand the majority of questions ☐

As the interviewer, how would you rate the respondent's attention to your questions? Respondent paid attention:
To the entire survey and answered all questions thoroughly ☐
Most of the time, but seemed to answer a few of the questions without really paying attention ☐
Not focused on the questions and seemed many of the answers were random ☐>

APPENDIX 2

SURVEY TREATMENT 2

VERSION 2

Interviewer.
Make sure you have the following materials before you begin an interview.

Your identification badge.
A complete copy of the survey
The set of trip descriptions on colored card stock
A pen
A copy of the consent form to give to the respondent.
6. Paper for respondent.

Before an interview, please provide this information.

Date:	
Time:	
Interviewer ID:	
Interview location	_____ VIP lounge ____ Coach class lounge ___ Before the security filter
How was participant selected?	

Good Morning,
My name is: <*Interviewer name*>, I am working on a research project funded by the University of Massachusetts Amherst (in the USA) with the support of LACEEP (the Latin-American and Caribbean Environmental Economics Program). We are conducting a survey of tourists in the Galapagos Islands. May I ask you a few questions?

1. Are you a tourist visiting the Galapagos islands? Yes ☐ No☐

2. During your trip to the Galapagos Islands, where did you spend most of your nights?
On a cruise boat ☐

In a hotel at a local town ☐

Equal time spent on a cruise boat and in a hotel at a local town ☐

<If the tourist answers: "NO" in Q.1, or answers: "In a hotel at a local town" in Q.2, interviewer thanks the person and explain that this survey is applied just to tourists that visited Galapagos by boat. Stop the survey>

To thank you for taking the time to do our survey, you will be entered into a raffle drawing. The top prize is a $100 gift card to the Amazon.com website. There are 4 second prizes as well of $25 gift cards. We expect the odds will be based on the number of participants in the survey. *<If the respondent asks about the odd of winning you can mention they are high (1 in 50) because we are expecting to have 500 participants>***.**

<Interviewer please say: Before we proceed, I'd like to tell you why we are doing this survey. >

We are interested to learn how people value and feel about visiting this protected area.

The information from this survey will be used on a research project of the Department of Resource Economics of the University of Massachusetts Amherst and the results will be submitted to the Galapagos National Park Administration for their use.

All your answers will be kept confidential. The interview lasts about 20 to 30 minutes. At any time you may stop the interview or not answer a specific question.

Are you willing to participate in this interview? Yes ☐ No☐

< If the respondent says YES continue with the interview. Please mention that (at the end of the interview you are going to hand out a copy of the consent form.. If the respondent is not willing to participate in the interview please record the reason given for not participating, and also hand out a copy of the consent form.>

<Record here the reason the respondent did not want to participate>

_____

_____

_____

SECTION I

Information about your current visit to the Galapagos National Park

I.1. What was the name of the boat you used to travel around the islands?: _____

I.2. Before your visit, did you consider any other destinations for your vacation instead?

Yes ☐ No ☐ *<If the answer is No, go to I.4.>*

If yes, Where?: _____

I.2.a. Approximately how much did you expect to spend per person in this alternative destination (including lodging, food, entertainment, local transport and tips, please DO NOT include airfare from your home country to the destination)? All prices are listed in US $:

Less than US$ 1,000 ☐

US$ 1,001 to 2,500 ☐

US$ 2,501 to 5,000 ☐

US$ 5,001 to 7,500 ☐

More than US$ 7,500 ☐

I. 3. What is the main reason that you chose the Galapagos Islands instead of the alternative destination?:

_____

_____

I.4. How many nights did you spend in the Galapagos islands? : ____ number of nights.

I.4.a. Which of the following factors did you consider when you were deciding how many nights to stay in the Galapagos Islands for this trip? Please indicate all that apply to your decision: *<Check all that apply. If list more than one, ask which was the most important.>*

Factors	**Check all that apply**	**Check the most important**
Cost	☐	☐
Number of places I wanted to visit	☐	☐
The type of tours available in the Galapagos	☐	☐
The total amount of vacation time I have each year	☐	☐
Other (explain): _____	☐	☐

I.4.b. *<If the respondent choose "the type of tours…."*>What were you looking for in a tour package?:

_____

I.5. Beside this trip to the Galapagos, how many additional days do you plan to spend on vacation this year?

_____ (number of days).

I.5.a. How many of those vacation days will you spend traveling away from your home?

_____(number of days).

I.5.b.Was the amount of vacation time you had available an important factor in deciding how long to stay in the Galapagos Islands?

Not a factor ☐

Somewhat of a factor ☐

An important factor ☐

A very important factor ☐

I.6. How many islands did you visit during this trip? : _____

I.6.a. Overall do you feel that the time spent at each island was

Too little time ☐

About the right amount of time ☐

More than enough time ☐

I.7. On average, how many people were in your group when you visited different sites?: _____

I.8. How often did your tour group meet other tour groups at the sites?

Rarely ☐

Occasionally ☐

Often ☐

Always ☐

I.8.a. Do you think that the number of persons with whom you shared the visitor sites was:

Too few ☐

About right ☐

Too many ☐

I.9. Did you have a naturalist guide with you at most of the sites you visited?

Yes ☐ No ☐

I.9.a. Overall, on a scale from 1 to 10 (with 10 being very important), how important do you think it is to have a naturalist guide during the visit?

1	2	3	4	5	6	7	8	9	10
Not important									Very important

I.9.b. <If they answered "yes" *in I.9. ask this question*> Overall, on a scale from 1 to 10 (with 1 being limited knowledge and 10 being in-depth knowledge), how would you evaluate the knowledge of the guides at the Galapagos National Park? :

1	2	3	4	5	6	7	8	9	10
Bad, they had little knowledge about the natural history of the island and its ecology.								The best, they had a deep knowledge about natural history and ecology of the islands.	

I.10. Overall, on a scale from 1 to 10 (with 10 being the best), how would you rate your visit to the Galapagos National Park? :

1	2	3	4	5	6	7	8	9	10
The worst visit									The best visit

<Note: Interviewer - if the respondent answers question I.10 with a "7 " or less, go to I.10.a, otherwise, go to Section 2>

I.10.a. Why did you give a score of <*Score on Q.I.10*> for your visit ?:

_____

_____

_____

I.10.b. Which aspects of the park should be improved?:

_____

_____

_____

SECTION 2
Questions about tourism

In the next section I am going to show you different tour packages for the Galapagos Islands. These tour packages vary in the type of tour, length of tour, and the trip cost for within the islands.

<Hand the respondent the card stock with the descriptions of the attributes and levels. Give the respondent 1 minute to read>.

Let me explain further what I mean by each of these characteristics and how they vary across the different trip options:
<Now, continue with the explanation of the characteristics according with the script that summarizes the detailed explanation.>

1. The type of tour refers to the types of recreation and learning experiences available on the tour. There are two types of tour.

> **Overview (Highlights of Galapagos)**: This experience provides an overview of some of the most famous sites around the archipelago. You will get the flavor of the island and see the most emblematic species and landscapes. You will see the jewels of the island, but the guides will not elaborate on the individual species.
>
> **In depth (Following Darwin): T**his experience comprises an in-depth visit to all of the most famous sites of the archipelago. At the end of your trip you will have a deep understanding of the life cycles of the most emblematic species. These visits will include educational commentary by the guides that describe the complex evolutionary processes of the islands. The visitor has plenty of time to observe ecological and biological processes such as hunting, feeding, and mating.

2. The length of tour is the number of nights spent touring the islands. There are two trip lengths: **Short** trips, are 5 nights or less. And **long** trips are 7 nights or longer.

3. The trip cost for within the islands includes accommodation, full meals, local transportation within the archipelago, entrance fee for conservation and management of the islands, and guide services. It does not include airfare from the mainland to the islands, or airfare from your home country to Ecuador. The trip price options ranges from $1,000 to $7,000 per person.

II.1 Do you have any questions? *< Please record if there are or not questions. If yes, please answer the questions>*
Yes ☐ No☐

Now I am going to present to you a series of tour packages. All prices are listed in US $. Please choose one option from each card *<hand the responder the card block according the color of the survey>* **:**

II.2. Each column on the card represents a tour package. Assume you will have the opportunity to make another trip to the Galapagos Islands, all the packages will be similar in terms of quality of tourist services (lodging & food) and guide service. On each card, please choose the package you like the best.
If you are not comfortable choosing one alternative in one table you can choose "**Decline to take a trip**".

Characteristics	Package D	Package E	Decline to take a trip
Tour type	In depth (Following Darwin)	Overview (Highlights of Galapagos)	Under these circumstances I would not travel □
Length of trip	Long 7 nights or more	Short 5 nights or less	
Cost of the trip	$ 7,000 per person	$ 3,000 per person	
On my next trip, I would choose:	□	□	

II.2.a. Why did you pick that particular package?

_____

_____

II.2.b. Overall, on a scale of 1 to 10 (with 10 being very certain) how certain are you about the choice you just made? <*circle the number*>:

1	2	3	4	5	6	7	8	9	10
Very uncertain									Very certain

Characteristics	Package G	Package H	Package I	Decline to take a trip
Tour type	In depth (Following Darwin)	Overview (Highlights of Galapagos)	In depth (Following Darwin)	Under these circumstances I would not travel
Length of trip	Short 5 nights or less	Long 7 nights or more	Short 5 nights or less	
Cost of the trip	$ 7,000 per person	$ 5,000 per person	US$ 3,000 per person	
On my next trip, I would choose:	□	□	□	□

II.2.c. Overall, on a scale of 1 to 10 (with 10 being very certain), how certain are you about the choice you just made? <*circle the number*>:

1	2	3	4	5	6	7	8	9	10
Very uncertain									Very certain

Characteristics	Package J	Package K	Package L	Decline to take a trip
Tour type	Overview (Highlights of Galapagos)	In depth (Following Darwin)	Overview (Highlights of Galapagos)	Under these circumstances I would not travel
Length of trip	Long 7 nights or more	Short 5 nights or less	Long 7 nights or more	
Cost of the trip	$ 7,000 per person	$ 5,000 per person	US$ 1,000 per person	
On my next trip, I would choose:	□	□	□	□

II.2.d. Overall, on a scale of 1 to 10 (with 10 being very certain), how certain are you about the choice you just made? <*circle the number*>:

1	2	3	4	5	6	7	8	9	10
Very uncertain									Very certain

Characteristics	Package B	Package C	Decline to take a trip
Tour type	In depth (Following Darwin)	Overview (Highlights of Galapagos)	Under these circumstances I would not travel
Length of trip	Long 7 nights or more	Short 5 nights or less	
Cost of the trip	$ 3,000 per person	US$ 1,000 per person	
On my next trip, I would choose:	□	□	□

II.2.e.What factors were important in picking this package?

_____

_____

II.2.f. Overall, on a scale of 1 to 10 (with 10 being very certain), how certain are you about the choice you just made? <*circle the number*>:

1	2	3	4	5	6	7	8	9	10
Very uncertain									Very certain

SECTION 3

Questions on expenditures

III.1. In US $. how much did this vacation in the Galapagos Islands cost per person? Please include the cost of accommodation, all meals, local transportation within the archipelago, entertainment, guide services, tips and gratuities, DO NOT include the entrance fee into the national park, airfare from Ecuador mainland or from your home country)?

US$ _____

<III.1.a. If the respondent can not provide an answer, please ask why?:>

III.2. Did you visit local towns within the Galapagos (i.e. Santa Cruz, San Cristóbal, Isabela)?

Yes ☐ No ☐

III.2.a. If yes, how much do you estimate you spent in the local towns per person?

US$_____

III.3. What entrance fee did you pay per person when you entered the Galapagos National Park? :

US$_____

In the future, the entrance fee may change. This fee goes to support conservation and resource management in the Galapagos islands. The new fee would be between $150 and $350.

<The script has an explanation of how the fee is used and distributed among Galapagos institutions>.

III.4. Would you pay US$ 250 as entrance fee to the Galapagos National Park

Yes ☐ No ☐

<If Yes go to III.5; if NO go to III.4.a>

III.4.a. Would you pay US$ 150 as entrance fee to the Galapagos National Park?

Yes ☐ No ☐

< if "YES" go to III.4.b; if "NO" GO TO Section 4>

III.4.b. Would you pay US$ 200 as entrance fee to the Galapagos National Park?

Yes ☐ No ☐

<Go to next section after either answer>

III.5. Would you pay US$ 350 as entrance fee to the Galapagos National Park (as it is now, no changes)?

Yes ☐ No ☐

<If Yes go to Section 4; if NO go to III.5.a>

III.5.a. Would you pay US$ 300 as entrance fee to the Galapagos National Park?

Yes ☐ No ☐

<Go to next section after either answer>

SECTION 4

Questions on <u>people's preferences</u>

In this section, I am going to ask about your preferences of current affairs and your hobbies.

IV.1. In your personal opinion, how important are the following problems for developing countries like Ecuador? <*Please mark with an X accordingly*>.

Problem	**Very Important**	**Important**	**Somewhat Important**	**Not important**	**Don't Know**
a) Fighting crime					
b) Improving public education and health					
c) Protecting the environment and endangered ecosystems					
d) Generating employment					
e) Improving city sanitization					

IV.1.a. Which issue do you think is the most important?: _____

IV.2. In your personal opinion how important are the following global problems? <*Please mark with an X accordingly*>

Problem	**Very Important**	**Important**	**Somewhat important**	**Not important**	**Don't Know**
a) Hunger and poverty around the world					
b) Energy and natural resource prices					
c) Loss of biodiversity and ecosystems from development					
d) Global warming and climate change effects					
e) International crime and drug trafficking.					
f) International terrorism					

IV.2.a. Which one do you think is the most important? : _____

IV.3. People like to spend their free time in a variety of activities. Some examples are: outdoor activities, visiting museums, going shopping or to the movies, etc. Of these activities, which one do you do the most often? Would you say <*list them again*> <u>*<Note: Interviewer mark the*</u>

activity chosen with "1">. Which do you do the second most often? *<Note: Interviewer mark the activity chosen with "2" >*

Activities	**# Rank**
Outdoor activities such as hiking, biking, & swimming.	
Visiting museums and art events	
Going to the movies/ shopping	
Another activity:	

IV.4. In the past five years, how many trips have you taken for the primary purpose of seeing wildlife or enjoying nature that lasted 3 days or more? Please DO NOT include this visit to Galapagos.

_____(number of trips).

IV.5. Do you belong to any environmental or conservation organizations?

Yes ☐ No ☐

SECTION 5

Questions on background information

Before we finish this last section, let me remind you that ALL of your answers will be kept strictly confidential.

V.1. What is your age? _____ (number of years)

V.2. Are you: _____ FEMALE? or _____ MALE?

V.3. What is your nationality?: _____

V.3. a. In which country do you reside?:_____

V.4. Excluding yourself, how many family members live with you? _____ (number of people)

V.4.a. How many of these are under 18 years old? _____ (number)

V.5. What is the highest education level you have completed?

Junior high ☐

High school ☐

Some college or technical school ☐

Completed college ☐

Graduate school or professional school ☐

V.6. Would you describe yourself as:

Formerly employed but now retired ☐

Employed full-time by someone else ☐

Employed part-time by someone else ☐

Self-employed ☐

Not employed ☐

V.7. Which household income category best fits your household? Income levels per year are listed in US$:

Less than US$ 25,000 ☐

US$ 26,000 to 50.000 ☐

US$ 51,000 to 75,000 ☐

US$ 76,000 to 100,000 ☐

US$ 101,000 to 250,000 ☐

More than US$ 251,000 ☐

V.8. Do you have any concerns or comments about your visit to the Galapagos Islands that you would like to share? Please feel free to write them on this sheet
< Hand them the note paper and a pen. Say to the person she can return the paper when she is done >

*< **REMEMBER**: Hand out a copy of the Consent Form>*

<If she wants to participate in the raffle, we need an email address (or physical address) to contact her in case of winning. Hand out the card to fill out. Tell them that the card with email address will be kept separate from the survey.>

<Finally, say thanks the person for her time and wish her a pleasant trip back home>

<ATTENTION: If the respondent stopped the interview before the survey's end. Please record the reason:
Decline to go on ☐
Plane boarding ☐
Other: _____ ☐*>*

<OBSERVATIONS *Time survey ended:_____*

As the interviewer, how would you rate the respondent's understanding of the questions? Respondent seemed to understand:
All questions ☐
Most of the questions ☐
Did NOT understand the majority of questions ☐

As the interviewer, how would you rate the respondent's attention to your questions? Respondent paid attention:
To the entire survey and answered all questions thoroughly ☐
Most of the time, but seemed to answer a few of the questions without really paying attention ☐
Not focused on the questions and seemed many of the answers were random ☐*>*

APPENDIX 3

SUMMARY STATISTICS

Table A. Continuous Variables

Table B. Categorical Variables

Table C: Means of Selected Variables

Table A: Continuous Variables

	Version 1					Version 2					Aggregate				
Variables	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
Length of stay	256.0	6.7	2.7	3.0	21.0	245.0	6.6	2.1	3.0	15.0	501.0	6.6	2.4	3.0	21.0
Additional says of vacation	263.0	58.1	85.7	0.0	365.0	258.0	67.0	100.8	0.0	365.0	521.0	62.5	93.5	0.0	365.0
Number of Iilands visited	259.0	6.5	2.1	3.0	14.0	254.0	6.5	1.9	3.0	16.0	513.0	6.5	2.0	3.0	16.0
Expenses per person (US$)	204.0	3122.3	1907.4	0.0	10000.0	192.0	3286.3	2711.9	400.0	25000.0	396.0	3201.8	2330.8	0.0	25000.0
Expenses in local towns per person (US$)	229.0	118.9	175.2	0.0	1200.0	230.0	139.0	313.9	0.0	3000.0	459.0	128.9	254.3	0.0	3000.0
Number of trip done in the last five year for nature appreciation	248.0	6.3	11.2	0.0	100.0	239.0	5.0	7.2	0.0	50.0	487.0	5.7	9.5	0.0	100.0
Number of family members	248.0	1.2	1.1	0.0	6.0	240.0	1.3	1.1	0.0	5.0	488.0	1.2	1.1	0.0	6.0
Number of family members under 18 y. old.	245.0	0.2	0.6	0.0	4.0	237.0	0.3	0.7	0.0	3.0	482.0	0.2	0.6	0.0	4.0
Age	246.0	46.9	15.9	18.0	85.0	238.0	47.4	16.8	16.0	80.0	484.0	47.1	16.4	16.0	85.0

Table B: Categorical Variables

	Version 1			Version 2			Aggregate		
Answer	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.
ALTERNATIVE DESTINATION TO GLPS									
NO	216	81.20	81.20	216	83.08	83.08	432	82.13	82.13
YES	50	18.80	100.00	44	16.92	100.0	94	17.87	100.0
Total	266	100.00		260	100.00		526	100.00	
LENGTH OF STAY									
Days	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.
0 – 6	88	34.38	34.38	78	31.84	31.84	166.0	33.1	33.1
7 or more	168	65.63	100.00	167	68.16	100.00	335.0	66.9	100.0
Total	256	100.00		245	100.00		501.0	100.0	
MOST IMPORTANT FACTOR FOR LENGTH OF STAY									
Answer	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.
Cost	40	15.56	15.56	41	20.2	20.2	81.0	17.6	17.6
Number of places I wanted to visit	70	27.24	42.8	64	31.53	51.72	134.0	29.1	46.7
Other	38	14.79	57.59	23	11.33	63.05	61.0	13.3	60.0
The total amount of vacation time	35	13.62	71.21	21	10.34	73.4	56.0	12.2	72.2
The type of tours available in Galapagos	74	28.79	100	54	26.6	100	128.0	27.8	100.0
Total	257	100		203	100		460.0	100.0	
TIME SPENT IN THE ISLAND WAS?									
Answer	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.
About the right amount of time	214	81.99	81.99	220	85.94	85.94	434.0	84.0	84.0
More than enough time	6	2.3	84.29	2	0.78	86.72	8.0	1.6	85.5
Too little time	41	15.71	100	34	13.28	100	75.0	14.5	100.0
Total	261	100		256	100		517.0	100.0	
NUMBER OF PERSONS IN YOUR GROUP AT VISITOR SITE*									
# of persons	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.
0 – 10	54	21.2	21.2	39	15.7	15.7	93	18.5	18.5
11 - 16	196	76.9	98.0	204	81.9	97.6	400	79.4	97.8
17 or more	5	2.0	100.0	6	2.4	100.0	11	2.2	100.0
Total	255	100		249	100		504	100	

* 16 max size group allowed.

…Continued: Table B: Categorical Variables

	Version 1			Version 2			Aggregate		
IMPORTANCE TO HAVE A GUIDE									
SCORE	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.
4				1	0.39	0.39	1	0.19	0.19
5	1	0.38	0.38	1	0.39	0.78	2	0.38	0.58
6	2	0.76	1.15				2	0.38	0.96
7	8	3.05	4.20	6	2.33	3.10	14	2.69	3.65
8	17	6.49	10.69	23	8.91	12.02	40	7.69	11.35
9	34	12.98	23.66	42	16.28	28.29	76	14.62	25.96
10	200	76.34	100.00	185	71.71	100.00	385	74.04	100.00
Total	262	100		258	100		520	100	

*1= least important. 10= most important.

RATE THE GUIDE									
SCORE	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.
1				1	0.39	0.39	1	0.19	0.19
3	2	0.76	0.76	1	0.39	0.78	3	0.58	0.77
4	6	2.29	3.05	1	0.39	1.17	7	1.35	2.12
5	3	1.15	4.2	3	1.17	2.33	6	1.16	3.28
6	6	2.29	6.49	8	3.11	5.45	14	2.70	5.97
7	21	8.02	14.5	13	5.06	10.51	34	6.55	12.52
8	44	16.79	31.3	30	11.67	22.18	74	14.26	26.78
9	48	18.32	49.62	74	28.79	50.97	122	23.51	50.29
10	132	50.38	100	126	49.03	100	258	49.71	100.00
Total	262	100		257	100		519	100.00	

RATE GALAPAGOS									
SCORE	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.
1	1	0.38	0.38				1	0.19	0.19
4				1	0.39	0.39	1	0.19	0.39
5				1	0.39	0.78	1	0.19	0.58
6	2	0.76	1.15	2	0.78	1.56	4	0.77	1.35
7	14	5.34	6.49	10	3.91	5.47	24	4.63	5.98
8	36	13.74	20.23	31	12.11	17.58	67	12.93	18.92
9	82	31.30	51.53	91	35.55	53.13	173	33.40	52.32
10	127	48.47	100.00	120	46.88	100.00	247	47.68	100.00
Total	262	100		256	100		518	100	

VISIT LOCAL TOWNS									
Answers	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.
No	23	9.1	9.1	16	6.5	6.5	39	7.8	7.8
Yes	229	90.9	100.0	230	93.5	100.0	459	92.2	100.0
Total	252	100		246	100		498	100	

…Continued: Table B: Categorical Variables

	Version 1			Version 2			Aggregate		
MOST IMPORTANT ISSUE FOR DEVELOPING COUNTRIES									
Answer	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.
Fighting crime	26	10.4	10.4	27	11.2	11.2	53	10.8	10.8
Generating employment	13	5.2	15.7	16	6.6	17.8	29	5.9	16.7
I do not know	5	2.0	17.7	6	2.5	20.3	11	2.2	19.0
Improving city sanitization	5	2.0	19.7	6	2.5	22.8	11	2.2	21.2
Improving public education and health	122	49.0	68.7	110	45.6	68.5	232	47.4	68.6
Protecting the environment and endanger	78	31.3	100.0	76	31.5	100.0	154	31.4	100.0
Total	249	100		241	100		490	100	
MOST IMPORTANT GLOBAL ISSUE									
	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.
Energy and natural resource prices	19	7.6	7.6	11	4.6	4.6	30	6.1	6.1
Global warming and climate change effects*	34	13.7	21.3	50	20.8	25.3	84	17.1	23.3
Hunger and poverty around the world	111	44.6	65.9	120	49.8	75.1	231	47.1	70.4
I do not know	3	1.2	67.1	1	0.4	75.5	4	0.8	71.2
International crime and drug traffic.	9	3.6	70.7	6	2.5	78.0	15	3.1	74.3
International terrorism	23	9.2	79.9	21	8.7	86.7	44	9.0	83.3
Loss of biodiversity and ecosystems*	50	20.1	100.0	32	13.3	100.0	82	16.7	100.0
Total	249	100		241	100		490	100.0	
MEMBER OF A CONSERVATION ORGANIZATION									
	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.
No	151	60.6	60.6	143	59.6	59.6	294	60.1	60.1
Yes	98	39.4	100.0	97	40.4	100.0	195	39.9	100.0
Total	249	100		240	100		489	100	
GENDER									
	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.
Female	136	54.6	54.6	122	50.8	50.8	258	52.8	52.8
Male	113	45.4	100.0	118	49.2	100.0	231	47.2	100.0
Total	249	100		240	100		489	100	

* The z –test suggests that the proportions between version 1 and 2 are statistically different (5% significance level).

…Continued: Table B: Categorical Variables

	Version 1			Version 2			Aggregate		
NATIONALITY									
	Freq.	Percent	Cum.	Freq	Percent	Cum.	Freq.	Percent	Cum.
North America	134	54.0	54.0	134	55.8	55.8	268.0	54.9	54.9
Europe	85	34.3	88.3	74	30.8	86.7	159.0	32.6	87.5
Others (Asia, Latin-America, and Oceania)	29	11.7	100.0	32	13.3	100.0	61.0	12.5	100.0
Total	248	100		240	100		488.0	100.0	
EDUCATION									
	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.
Completed college	79	31.9	31.9	78	32.6	32.6	157	32.2	32.2
Graduate school/professional school	126	50.8	82.7	125	52.3	84.9	251	51.5	83.8
High school	22	8.9	91.5	12	5.0	90.0	34	7.0	90.8
Junior high	1	0.4	91.9	1	0.4	90.4	2	0.4	91.2
Some college or technical school	20	8.1	100.0	23	9.6	100.0	43	8.8	100.0
Total	248	100		239	100		487	100	
OCUPATION									
	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.
Employed full-time	109	43.8	43.8	95	39.8	39.8	204	41.8	41.8
Employed part-time	19	7.6	51.4	16	6.7	46.4	35	7.2	49.0
Formerly employed (r)	49	19.7	71.1	56	23.4	69.9	105	21.5	70.5
Not employed	23	9.2	80.3	34	14.2	84.1	57	11.7	82.2
Self-employed	49	19.7	100.0	38	15.9	100.0	87	17.8	100.0
Total	249	100		239	100		488	100	
INCOME									
	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.
Less than US$ 25,000	12	5.4	5.4	13	6.0	6.0	25.0	5.7	5.7
US$ 26,000 to 50.000	38	17.0	22.3	22	10.1	16.1	64.0	14.5	20.2
US$ 51,000 to 75,000	34	15.2	37.5	40	18.4	34.6	139.0	31.5	51.7
US$ 76,000 to 100,000	43	19.2	56.7	36	16.6	51.2	60.0	13.6	65.3
US$ 101,000 to 250,000	65	29.0	85.7	74	34.1	85.3	74.0	16.8	82.1
More than US$ 251,000	32	14.3	100.0	32	14.8	100.0	79.0	17.9	100.0
Total	224	100		217	100		441.0	100.0	

Table C: Means of Selected Variables

Means

	Ours (2009)			Epler's (2006)			Izurieta-Sinay (2007)			Epler vs Ours Data Set		Izurieta-Sinay vs Our Data Set		Epler vs Izurieta -Sinay Data set	
	Mean	St. D.	n	Mean	St. D.	n	Mean	St. D.	n	Result.[a]	t-student / z	Result	t-student / z	Result	t-student / z
Age	47.1	16.4	484	44.4	18.1	628	44.2	15.2	425	Reject Ho.	-2.6	Reject Ho.	-2.7	FTR Ho.	0.001
Length of stay	6.6	2.4	501	6.5	3.5	650	6.9	4.1	433	FTR Ho.	-0.5	FTR Ho.	1.3391	FTR Ho.	-1.6199
Expenses[b]	3201.8	2330.8	396	3322.0	1745.0	529	n.a.	n.a.	n.a.	FTR Ho.	0.9	n.a	n.a.	n.a.	n.a.

(a): Ho: Mean differences equal 0; Reject or fails to reject Ho at 99% level of confidence.
(b): Mean expenses and standard deviation in Epler's data set are respectively US$ 3322 and US$3200. They includes airfare, which is in average US$1455. With that adjustment the new mean is US$ 3322. We test the null hypothesis. using the adjusted values.

Percentages of individuals per Age classes

	Ours	Epler	Fomin	Results [a]		
				Ours vs Epler	Ours vs Fomin	Epler vs. Fomin
Years						
15-34	29.6	32.32	35.06	FTR Ho.	FTR Ho.	FTR Ho.
35-50	26.3	30.25	26.35	FTR Ho.	FTR Ho.	FTR Ho.
51-64	26.7	29.78	27.76	FTR Ho.	FTR Ho.	FTR Ho.
65 or +	17.4	7.64	10.82	Reject Ho.	Reject Ho.	FTR Ho.
Total	100	100	100			
N	483	628	425			

(a): Ho: Proportion differences equal 0; Reject or fails to reject Ho at 99% level of confidence.

Percentages of individuals per Country of Residence

	Ours	Epler	Izurieta-Sinay	Results [a]		
				Ours vs Epler	Ours vs Izurieta-Sinay	Epler vs. Izurieta-Sinay
North-America	54.9	45.06	40	Reject Ho.	Reject Ho.	FTR Ho.
Europe	32.6	42.99	46.98	Reject Ho.	Reject Ho.	FTR Ho.
Other	12.5	11.94	13.02	FTR Ho.	FTR Ho.	FTR Ho.
Total	100	100	100			
N	488	628	430			

(a): Ho: Proportion differences equal 0; Reject or fails to rejects Ho at 99% level of confidence.

Percentage of individuals per Income Classes

US $.	Ours	Epler	Izurieta-Sinay	Results [a]		
				Ours vs Epler	Ours vs Izurieta-Sinay	Epler vs. Izurieta-Sinay
< $25000	5.7	9.4	9.46	FTR Ho.	FTR Ho.	FTR Ho.
$26000 - $50000	14.5	14.2	13.78	FTR Ho.	FTR Ho.	FTR Ho.
$51000 - $75000	31.5	13.24	18.38	Reject Ho.	Reject Ho.	FTR Ho.
$76000 - $100000	13.6	15.16	12.43	FTR Ho.	FTR Ho.	FTR Ho.
> $100000	34.7	47.98	45.95	Reject Ho.	Reject Ho.	FTR Ho.
Total	100		100			
N	441		370			

(a): Ho: Proportion differences equal 0; Reject or fails to reject Ho at 99% level of confidence.

BIBLIOGRAPHY

Adamowicz, W., J. Louviere, and J. Swait (1998), 'Introduction to attribute –based stated choice methods', Final Report submitted to: Resource Valuation Branch Damage Assessment Center NOAA – US Department of Commerce.

Ajzen, I., T.C. Brown, and L. H. Rosenthal (1996), 'Information bias in contingent valuation: effects of personal relevance, quality of information and motivational orientation', *Journal of Environmental Economics and Management* **30**: 42-57.

Alegre, J., and L. Pou (2005). 'The length of stay in the demand for tourism', *Tourism Management* **27**: 1343-1355.

Alpízar, F. (2006).'The pricing of protected areas in nature based tourism: a local perspective', *Ecological Economics* **56**: 294-307.

Alvarez-Farizo B., N. Hanley, R. Barberan, A. Lazaro (2000). 'Choice modeling at the "market stall": individual versus collective interest in environmental valuation', *Ecological Economics* **60**: 743-751.

Anderson, N.H. (1970). 'Functional measurement and psychophysical judgment', *Psychological Review.* **77:** 153-170. (In Adamowicz, *et al.,* 1998).

Anderson, N.H. (1981), *Foundations of Information Integration Theory*, New York: Academic Press. (In Adamowicz, *et al.* 1998).

Anderson, N.H. (1982), *Methods ofIinformation Integration Theory*, New York: Academic Press. (In Adamowicz, *et al.* 1998).

Arrow, K., R. Solow, P. Portney, E. Leamer, R. Radner and H. Schuman (1993). 'Report of the NOAA panel on contingent valuation', *Federal Register* **58(10):** 4601-4614.

Baskaran R., R. Cullen, & S. Wratten (2007), 'Estimating the value of ecosystem services in New Zealand pastoral farming – A choice modeling approach', Document presented in the New Zealand Association of Economists Annual Conference 2007.

Ben-Akiva, M., and S.R. Lerman (1985), *Discrete Choice Analysis: Theory and Application to Travel Demand*, Cambridge (Massachusetts): Eds. The MIT Press Sixth printing 1994,(In: Silberhorn, *et al.*, 2006).

Bennett, J., M.V. Bueren, and S. Whitten. (2004), 'Estimating society's willingness to pay to maintain viable rural communities', *The Australian Journal of Agricultural and Resource Economics* **48(3):** 487-512.(In: Baskaran *et al,.* 2007).

Bensted-Smith, R., G. Powell, and E. Dinerstein (2002), 'Planning for the ecoregion', in R. Bensted-Smith (ed.), *A Biodiversity Vision for the Galapagos Islands*, pp. 1–5. Puerto Ayora (Galapagos, Ecuador): Charles Darwin Foundation and World Wildlife Fund, pp. 1-5.

Bergstrom, J.C., J.R. Stoll, and A. Randall (1989), 'Information effects in contingent markets', *American Journal of Agricultural Economics* **71(3)**: 683-691.

Bhat, C.R. (1997), 'Covariance heterogeneity in Nested Logit Models: Econometric structure and application of intercity travel', *Transportation Research Part B* **31(1)**: 11-21. (In: Silberhorn *et al.*, 2006).

Blamet, R., J. Rolfe, J. Bennett, and M. Morrison (2000), 'Valuing remnant vegetation in Central Queensland using choice modeling', *The Australian Journal of Agricultural and Resource Economics* **44(3):** 439-456. (In: Baskaran *et al.*, 2007).

Blamey, R.K., J.W. Bennett, J. Louviere, M.D. Morrison, and J. Rolfe (1998), 'Attribute selection in environmental choice modelling studies: the effect of causally prior attributes', *Choice Modelling Research Report No.7*, University College, University of New South Wales, Canberra.

Boyle, K.J. (1989), 'Commodity specification and the framing of contingent-valuation questions', *Land Economics* **65(1)**: 57-63.

Brau R., and D. Cao (2006), 'Uncovering the macrostructure of tourists' preferences: A choice experiment analysis of tourism demand to Sardinia', Working Paper 33.2006. Fondazione Eni Enrico Mattei.

Chib S., P.B. Seetharaman, and A. Strijnev (2004), 'Model of brand choice with a no-purchase option calibrated to scanner-panel data', *Journal of Marketing Research* **41(2):**184-196. (In: Silberhorn *et al.*, 2006).

Chintagunta P.K. and N.J. Vilcassim (1998), 'Empirical implications of unobserved household heterogeneity for manufacturer and retailer pricing', *Journal of Retailing and Consumer Services* **5(1):**15-24. (In: Silberhorn *et al.*, 2006).

Domencich, T. and D. McFadden (1975), *Urban Travel Demand A Behavioural Analysis*, New York and Oxford: Elsevier. (In: Hensher *et al*., 2005).

Egret Communications and ARA Consulting (2001), 'Galapagos Islands, Ecuador tourism growth', Case Study Prepared as a part of the Juneau Tourism Management Planning Process.

Epler B. (2007), 'Tourism, the economy, population growth, and conservation in Galapagos', Report submitted to Charles Darwin Foundation, Puerto Ayora (Galapagos, Ecuador).

Fleischer, A. and A. Pizamb (2002), 'Tourism constraints among Israeli seniors', *Annals of Tourism Research* **29(1)**: 106-123.

Gokovali, U., O. Bahar, M. Kozak (2006), 'Determinants of length of stay: a practical use of survival analysis', *Tourism Management* **28**: 736-746.

Guadagni, P.M. and J.D.C. Little (1983), 'A logit model of brand choice calibrated on scanner data', *Marketing Science* **2(3):** 203-238. (In: Silberhorn *et al.*, 2006).

Haab, T.C., and K.E. McConnell (2002), *Valuing Environmental and Natural Resources: The Econometrics of Non-Market Valuation,* New Horizons in Environmental Economics, Edward Elgar Publishing, Inc.

Haaijer, R., W. Kamakura and M. Wedel (2001), 'The 'no-choice' alternative to conjoint choice experiments', *International Journal of Market Research* **43(1)**: 93-106.

Hammond, K.R. (1955), 'Probabilistic functioning and the clinical method', *Psychological Review* **62**: 255-262. (In Adamowicz *et al.*, 1998).
Hanley N., R. E. Wright and B. Alvarez-Farizo (2006), 'Estimating the economic value of improvements in river ecology using choice experiments: an application to the water framework directive', *Journal of Environmental Management* **78**: 183-193.

Hanley, N., W. Adamowicz, and R.E. Wright (2005),'Price vector effects in choice experiments: an empirical test', *Resource and Energy Economics* **27**: 227-234.

Hearne R., and Z. M. Salinas (2002), 'The use of choice experiments in the analysis of tourist preferences for ecotourism development in Costa Rica', *Journal of Environmental Management* **65**:153-163.

Hensher D.A., J.M. Rose, and W.H. Greene (2005), *Applied Choice Analysis: A Primer*, Cambridge: Cambridge University Press.

Hess S., and J.M. Rose (2009), 'Allowing intra-respondent variations in coefficients estimated on repeated choice data', *Transportation Research Part B* **43**: 708-719.

Hole, A.R. (2007), 'A comparison of approaches to estimating confidence intervals for willingness to pay measures', *Health Economics* **16**: 827-840.

Hunt, G.L. (2000), 'Alternative nested logit model structures and the special case of partial degeneracy', *Journal of Regional Science* **40(1):**89-113. (In: Silberhorn *et. al.*, 2006).

Huybers, T. (2003), 'Domestic tourism destination choices- A choice modeling analysis', *International Journal of Tourism Research* **5**: 445-459.

Izurieta A.V. and L. Sinay (2008), 'Estudio de demanda turística en Galápagos', Consulting Report to Inter-American Development Bank –CAPTURGAL, Santa Cruz (Ecuador).

Kannan P. K. and G.P. Wright (1991), 'Modeling and testing structured markets: A nested logit approach', *Marketing Science* **10(1):** 58-82. (In: Silberhorn *et al.*, 2006).

Knapp, T.A., N.E. White, D.E. Clark (2001), 'A nested logit approach to household mobility', *Journal of Regional Science* **41(1):**1-22. (In: Silberhorn *et al.*, 2006).

Kragt, M.E. and J.W. Bennett (2010), 'The impacts of attribute level framing and changing cost levels on choice experiments value estimates', Paper presented at the 54th Annual Conference Australian Agricultural and Resource Economics Society, Adelaide (February, 2010).

Lancaster, K. (1966), 'A new approach to consumer theory', *Journal of Political Economy* **74**: 132-157.

Leuschner W.A., P.S. Cook, J.W. Roggenbuck, and R.G. Oderwald (1987), 'A comparative analysis for wilderness uses fee policy', *Journal of Leisure Research* **19:** 101-14. (In Chase L. *et al.*, 1998).

Louviere J.J., D.A. Hensher, and J.D. Swait (2000), *Stated Choice Methods: Analysis and Application*, Cambridge: Cambridge University Press.

Machado K.B. (2001), 'Ecotourism: Funding conservation programs through entrance fees. The case of the Galapagos National Park', in: R. E. Rhoades and J. Stalling (eds.), *Integrated Conservation and Development in Tropical America*, CARE-SUBIR, pp. 153-168.

Manski, C. (1977), 'The structure of random utility models', *Theory and Decision* **8:** 299-254. (In Adamowicz, *et al.*, 1998).

McElroy, J.L. (2003), 'Tourism Development in Small Islands Across the World', *Geografiska Annaler* **85(4)**: 231-242.

McFadden, D. (1973), 'Conditional logit analysis of qualitative choice behavior', in P. Zaremka (ed.). *Frontiers in Economics,* New York: Academic Press.

McFadden, D. (1974), 'Measurement of urban travel demand', *Journal of Public Economics* **3(4):** 303-28. (in McFadden, 1980).

McFadden, D. (1980), 'Econometric models for probabilistic choice among products', *Journal of Business* **53(3.2)**: S13-S29.

Mogas, J., P. Riera, and J. Bennett (2006), 'A comparison of contingent valuation and choice modeling with second order interactions', *Journal of Forest Economics* **12:** 5-30. (In: Baskaran *et al.*, 2007).

Naidoo R., and V L. Adamowicz (2005), 'Biodiversity and nature-based tourism at forest reserves in Uganda', *Environmental and Development Economics* **10**: 159-178.

Oleas R. (2008), 'Recomendaciones sobre el precio de entrada al Parque Nacional Galápagos', Consulting Report, Ministerio del Ambiente del Ecuador-Parque Nacional Galápagos, Santa Cruz (Galapagos, Ecuador).

Ortúzar, J.D. and L.G. Williumsen (2001), *Modelling Transport*, Third ed., John Wiley and Sons, Chichester.

Othman, J., J. Bennett, and R. Blamey (2004), 'Environmental values and resource management options: a choice modeling experience in Malaysia', *Environmental and Development Economics* **9**: 803-824. (In: Baskaran *et al.*, 2007).

Proaño ME., and B. Epler (2007), 'El turismo en Galápagos: una tendencia al crecimiento', In: *Galápagos Report 2006-2007*, Galápagos Nacional Park, Charles Darwin Foundation and Instituto Nacional Galápagos (INGALA), Santa Cruz (Ecuador).

Revelt, D. and K.E. Train (1998), 'Mixed Logit with repeated choices: households' choices of appliance efficiency level', *The Review of Economics and Statistics* **80(4):** 647-657.

Rogg H., C. Buddenhagen and C. Causton (2005), 'Experiences and limitations with pest risk analysis in the Galapagos Islands', in IPPC Secretariat (2005), *Identification of risks and management of invasive alien species using the IPPC framework*, Proceedings of the workshop on invasive alien species and the International Plant Protection Convention.

Rolfe, J., J. Bennett, and J. Louviere (2002), 'Stated values and reminders of substitute goods: Testing for framing effects with choice modeling', *Australian Agricultural and Resource Economics* **46(1)**:1-20.

Rolfe, J., and J. Windle (2010), 'Assessing national values to protect the health of the Great Barrier Reef', Research Report No. 72, Environmental Economics Research Hub, Crawford School of Economics and Government, Australian National University.

Samples, K.C., J.A. Dixon, and M.M. Gowen (1986), 'Information disclosure and endangered species valuation', *Land Economics* **62(3)**: 306-312.

Schläpfer, F. (2008), 'Contingent valuation: A new perspective', *Ecological Economics* **64**: 729-740.

Silberhorn, N. Y. Boztug, and L. Hildebrandt (2006), 'Estimation with the Nested Logit Model: Especification and software particularities', Economic Risk SFB 649 Discussion Paper 017, Humboldt University, Berlin

Slovic, P. and S. Lichtenstein (1971), 'Comparison of bayesian and regression approaches to the study of information processing judgment', *Organizational Behavior and Human Performance* **6:** 649-744. (In Adamowicz, *et al.*, 1998).

Swait, J., and J. Louviere (1993), 'The role of the scale parameter in the estimation and comparison of multinomial logit models', *Journal of Marketing Research* **30**:305-314

Taylor J. E., J. Hardner, and M. Stewart (2006), 'Ecotourism and economic growth in the Galapagos: An island economy-wide analysis', Working Paper N. 06-001, Department of Agricultural and Resource Economics, University of California Davis.

Thurstone, L.L. (1927), 'A law of comparative judgment', *Psychological Review* **4:**273-286. (In Adamowicz, *et al.*, 1998).

Train, K.E. (1980), 'A structured Logit Model of auto ownership and mode choice', *Review of Economic Studies* **47**: 357-370. (In: Silberhorn *et al.*, 2006).

Train, K.E. (2009), *Discrete Choice Methods with Simulation,* Cambridge: Cambridge University Press, Second Edition.

Watkins, G. and F. Cruz (2007), 'Galapagos at risk: A socioeconomic analysis of the situation in the archipelago', Charles Darwin Foundation, Puerto Ayora (Galapagos, Ecuador).

Whittington, D. (2002), 'Improving the performance of contingent valuation studies in developing countries', *Environmental and Resource Economics* **22**: 323-367.

Windle, J. and J. Rolfe (2005), 'Diversification choices in agriculture: a choice modeling case of sugarcane growers', *The Australian Journal of Agricultural and Resource Economics* **49:** 63-74. (In: Baskaran *et al.*, 2007).

Yellot, J.I. (1977), 'The relationship between Luce's choice axiom, Thurstone's Theory of comparative judgment, and the Double exponential distribution', *Journal of Mathematical Psychology* **15:**109-144. (In Adamowicz, *et al.*, 1998).