The Count Data Analysis of Coastal Recreation in Elmer's Island, Louisiana

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Abstract

Non-negative and integer nature of recreational trip-counts appear in the form of poisson or gamma distribution suggesting count data modeling technique. Over-dispersion in the data stresses the use of negative binomial approach. In fact, the non-negative quality of trip demand results in to the truncated data sets (at zero). Therefore, we employ poisson and negative binomial on truncated and un-truncated data and random parameter approaches in estimating travel demand for coastal recreation in Elmer's Island. We also employ ordered logit model to estimate the determinants of recreational trip demand in the past. The study result shows that the demographic and environmental variables have significant impact on demand. However, all models show statistically insignificant impacts of expenditure on recreational demand of costal wetlands. The unconvincing estimation associated with main variables, travel cost and/or income, suggest a careful attention toward the model selection.

1. Introduction

Survey sampling has been the most economically acceptable method to gather information on visitors of recreational amenities such as beaches, wetlands, camp sites or hiking trails. Through the survey technique, information are collected on individual recreational trip demand, which serves as a dependant variable in the analysis. Given such sampling technique, dependent variable is often the count of the recreational trips taken over a season or a year. As such, the individual trip counts are non-negative integers in nature. In addition, no data is collected for the individuals if the individual fails to make at least one trip to the site during a sampling period. The observations are therefore, truncated at zero trip.

The non-negative and integer nature of recreational trip-counts suggests the form of poisson or gamma distribution in the data and count data approach for analysis. Over-dispersion in the data again stresses the use of negative binomial approaches. In addition, the number of past visits reported in terms of increasing rank suggests some sort of model that recognizes the inherent nature of the order is essential

Shaw (1988) introduced truncated and endogenously stratified count data techniques to estimate the travel cost using survey data and Monte Carlo experiment. In the meantime, subsequent works expanded the application of the count data model to include truncated poisson and negative binomial distribution of dependent variables. Grogger and Carson (1991) employed standard and truncated poisson and negative binomial model to estimate a fishing demand in Alaska. Creel and Loomis (1990) used truncated and standard poisson and negative binomial models to estimate deer hunting in California. Hellerstein (1991) reviews the robustness of poisson and negative binomial models on estimating demand curve for the Boundary Waters Canoe Area located in Minnesota.

Most of these previous studies estimate the seasonal recreational demand and focus on how to estimate unbiased estimation. In 1995, Engling and Shonkwiler estimate the long run demand of recreational hiking sites using the count data model. Their study completes a set of models by developing a truncated and endogenously stratified negative binomial model. Similarly, Englin et al. (1998) extends the count data model by utility theoretic system of demand equations for Canadian wilderness parks and suggests the economic information added by economic theory is important in recreation demand estimation. Hagerty and Moerltner (2005) uses count data models and treats driving cost as individual specific variable. Their study finds that a perceived cost of driving is statistically different for every individual.

Basically, it has been suggested that count data model provides unbiased estimation of demand curve. Therefore, in this paper, we employ count data modeling techniques in order to estimate a recreational travel demand cost. The main models used in estimating travel demand include poisson and negative binomial approaches. In our study, we also employ ordered logit model to estimate the determinants of trip demand since individuals are asked to choose one of the categories describing the frequency of visits in the past. We apply four count data models in the truncated and non truncated data set to estimate the demand for recreational trip to the Elmer's Island.

2. Study Area

Elmer's Island, one of the most popular coastal recreation sites of Louisiana, has been closed since 2001 because of the dispute over the selling price. Initial estimates to property values ranged from $6 million, by the Elmer's family, to a preliminary estimate of $1 million by the state contracted land appraiser. State offered, open market price has been condemned for failing to capture prices reflective of environmental and non-use option for coastal recreation. This price difference has resulted into a controversy over selling price offered by the state.

Elmer's Island had been very popular destination for people who choose coastal recreation with a small entrance fee. For the past thirty years, The Island has been operated as a commercial campground and primitive area. The property has become a popular destination not only to Louisiana residents but also to out of state tourists (Curole and St.

Pe 2002). For nominal fee, users have had access to the location for fishing, bird watching, camping and beach combing. The area also provides significant habitat of numerous bird species and other forms of coastal marine life. In addition, the island is one of the only three accessible beaches in Louisiana. This creates a public pressure to reopen the island for public recreational use. Thus our study originates from such a price controversy over the Island's monetary value. In this study we attempt to estimate a demand function associated with recreational demand. The Study area is shown in Fig. 1.

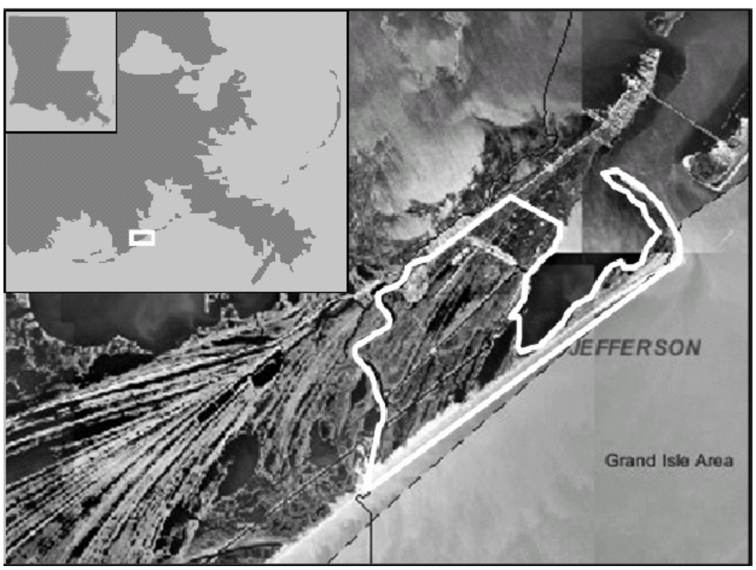

Fig 1. Study area

3. Data

Collecting data on individuals visiting the Elmer's Island is very difficult because the island is currently closed for recreational opportunities and varying nature of recreational activities were present when it was open. Intercept survey on proxy sites raises the concern of whether the sample represents general population visiting Elmer's Island

(Shaw, 1988). Furthermore, the samples obtained by mailing the population impose extremely high cost and low response rate. This is mainly because most of household consist zero visits. We therefore, include both the internet survey where respondents are self selective and intercept survey where the respondents are randomly chosen. Using both intercept and internet survey our study expects to reduce some interview bias and self selection bias, under a constrained budget.

Most of the observations (92%) are obtained from online survey posted on the web server. Louisiana State University, Department of Agricultural Economics and Agribusiness provided a space for research questionnaire on their webpage. Survey remained on the web for 77 days starting from May 15th to July 31st, 2003. Online survey responses were formatted in such a way that responses were recorded in a Microsoft excels spreadsheet automatically, once submitted by respondents. Duplicate responses were identified and only the first received response was considered deleting any responses with the same internet protocol (IP) address. Solicitation for the responses and announcement were posted on twenty eight media including direct mails, radio programs, newspapers, magazines, websites and newsletters.

Intercept survey was conducted at Grand Island State Park and Holley beach considering the fact that these sites are proxy sites for Elmer's Island. Commemorative hats were distributed to cooperating individuals on filling out a questionnaire set containing 34 individual questions. The intercept survey was conducted within 42 days using a series of multi-day trips to the sites during June and July, 2003.

Total of 2,691 online responses are gathered using both survey methods. Some of the observations with incomplete are dropped from the data set. The dependent variable is a category of people's preference to visit the Island. The survey gathered a variety of information including demographic variables such as age, gender, income, preference over different site quality, the purpose of their visit to evaluate whether joint or incidental visit have any affect on recreation demand.

Expenditure per trip is also included to capture the valuation of other attributes. The expenditure (travel cost) variable included price paid by individual for recreational and non recreational activities during the trip. The variables include cost of lodging, food, fuel, entry fee etc. One way travel time was also included in the questionnaire to obtain valuation of time. Ignoring value of travel time in estimating recreational demand model will result in a biased estimation of demand curve. The need for including travel time in recreation demand estimation is well documented in the past researches (Knetsch, 1963). Bockstael et al. (1987) suggest that time constraint cannot be incorporated with budget constraint. And Loomis, Yorizane and Douglas (2000) also argue against trading recreation time and money at a wage rate. Therefore, the time cost and other costs are treated as two separate variables in our analysis. The travel time in our study, includes two categories, the two-way travel time to the destination and the time spent on site for recreational activities.

Dependent variable used in the analysis includes the number past trips and expected future trips depending on the models used in estimation. The ordered logit model uses past trips while the count data model uses future visits. The number of times an individual visited the island in the past is hard to recall. We therefore, have classified the number of trips into seven different ranks (this includes <2, 2-4, 5-9…….. > 25).

3.1 Measuring the Site Characteristics

The theory of consumer behavior assumes that individuals place their choice decision based on the utility from good which is defined over quality and price of goods. The quality of recreational visit is often described by the measures of environmental quality factors such as pollution level, congestion, existence of wild life, or other environmental variables (Clark and Khan, 1989). Even though, site characteristics are important factors in modeling a recreation demand, existing literatures do not bear enough information to guide us which variables should be in the analysis. We, therefore, use our own arguments to select the variables that may have impact on consumer demand for coastal recreation.

In order to measure the impact of trip quality on recreational trip decision, the importance of site's physical and environmental characteristics have been measured. Levels of importance of those characteristics in choosing to visit Elmer's Island are measured by using 5 scale preference scales (5 being very important). And then, the level of importance for characteristics within physical and environmental quality is aggregated in order to change the preference level into a preference index for environmental quality and physical facilities as two variables. Environmental characteristics include existence of pollution, congestion and wildlife, while, physical characteristic consists of camping facility, interpretive signs, level of development, rules and regulations, nearby food and lodging, accessibility, and total catch of fish per trip.

4. Models and Estimation

The integer nature of recreational survey data explicitly arises because of the discrete choices type of questions for recreational trips. The number of trips becomes greater than or equal to zero as only the users visiting the sites are considered as respondents of survey. Under such scenarios, the count data approach is the mostly used estimation method to measure individual recreational behaviors (Shaw, 1988; Creek & Loomis 1990; and Hellerstein, 1991). Ordered logit is used for the analysis of determinants of past trip demand. The ordered rank of dependent variable suggest ordered logit model for estimation (Long, 1997).

4.1 Travel cost model

Travel Cost Method (TCM) has been a commonly used method to provide numerical value to the non market commodity such as open access areas or public outdoor recreational activities. TCM model assumes valuation of recreation can be revealed through consumer's behavioral response to different factors of travel demand. The method estimates a demand function for the number of trips using the travel expenditure as proxy for price of an environmental resource

4.1.1 Econometric Model of Recreational Demand

Long term demand for island recreation depends on a search process which results in individuals' utility maximization subject to budget constraints. Whether or not a visitor takes a trip depends upon the utility obtained from visiting the site. An individual evaluates whether the obtained utility from the recreational visit is worth the travel cost, which is, a measure of price paid for the trip and associated activities. Furthermore, the choice to visit Elmer's Island depends on the perceived site quality, alternative sites, and complementing purposes available. The demand of recreation can be formulated as following;

$$y_i = f(P_i, x_i, \beta) + \mu_i \quad \text{i = 1, 2, ...N} \qquad \text{…..(i)}$$

Where, y_i is the trip demanded by the i^{th} individual to visit the Elmer's Island, P_i is the travel cost associated with visiting the site. In travel cost model, the expenditure associated with recreational trips represents the price of recreation on that particular site. x_i is the vector of explanatory variables; β is a vector of unknown parameter and μ_i is the error term.

4.1.1.1 Count data model

The non-negative integer nature of the data suggests using count data estimation techniques to obtain the recreational demand function. Creel and Loomis (1991), Hellerstein (1991), and Hellerstein & Mendelson (1993), present both econometric and conceptual reasoning to use count data model for recreational demand estimation. Hellerstein & Mendelson's study reports that using a distribution function restricted to non-negative integers increases the estimation efficiency. Their study also suggests that count data estimation is consistent with a utility maximization model with repeated choice.

Standard count data estimator

The Poisson and negative binomial distributions captures the non-negative integers. Therefore, this study uses Poisson and negative binomial (Negbin) measures of the count data model to estimate demand for recreational trips to Elmer's Island. The poisson model imposes a restriction that the mean and the variance have to be equal. However, negative binomial model relaxes the restriction by permitting some differences between mean and variance. The general forms of the Poisson and Negative binomial models employ an exponential form of trip demand which changes equation (i) into the following form (Green, 2002):

$$\lambda_i = \exp(P_i, x_i, \beta) \qquad \text{………………. (ii)}$$

The probability density function for the Poisson model is expressed mathematically as:

$$prob(Y = y_i) = F_P \frac{e^{-\lambda_i} \lambda^{y_i}}{y_i!} \qquad \text{………………. (iii)}$$

Where, λ_i represents the conditional mean of y [E (Y/X)] which is y_i in equation (i). Under a Poisson distribution, the underlying assumption is:

E (Y*i*/X) = λ_i = $\exp(X, \beta)$

Var (Y/X) = λ_i $\exp(X, \beta)$ which often creates problems with real world data set. The mean variance relation conditional on regressors is violated under the presence of over-dispersion on a dependent variable. A more generalized form of poisson distribution, the negative binomial, results when the parameters distribute with a gamma random distribution. By choosing the density function to be a negative binomial with a dispersion parameter α_i and mean y_i the model can be expressed as;

$$prob(Y = y_i) = F_{NB} = \left[\frac{\Gamma(y_i + 1/\alpha_i)}{\Gamma(y_i + 1)\Gamma(1/\alpha_i)} \right] (\alpha_i \lambda_i)^{y_i} (1 + \alpha_i \lambda_i)^{-(y_i + 1/\alpha_i)} \text{ ..……(iv)}$$

Where, Γ represents the gamma distribution and α_i denotes the dispersion parameter. The mean and variances are;

E (Y*i*/X) = λ_i = $\exp(X\beta)$ ……………(v)

Var (Y/X) = λ_i $(1 + \alpha_i \lambda_i)$ ……………(vi)

Truncated Count Data Estimator

The standard Poisson model provides biased and inconsistent parameters. The common structure of truncated count data estimators follows the following form with a conditional mean:

$$E(Y = Y / X, Y > 0) = \lambda_i \left[1 - F_P(0)\right]^{-1} \qquad \text{…….…………….(vii)}$$

and with following probability function;

$$prob(Y = y_i / Y > 0) = \frac{e^{-\lambda_i} \lambda^{y_i}}{y_i!} \left[1 - F_P(0)\right]^{-1} \qquad \text{……..…………….(ix)}$$

A truncated count data framework provides consistent parameter estimates even in the presence of over-dispersion; however, the standard errors bias downwardly (Gourieoux et al., 1984; Cameron and Trivedi, 1986). Therefore, truncated negative binomial model is used to overcome such problems in the data. The model can be expressed as (Green, 2002):

$$prob(Y = y_i) = \left[\frac{\Gamma(y_i + 1/\alpha_i)}{\Gamma(y_i + 1)\Gamma(1/\alpha_i)}\right] (\alpha_i \lambda_i)^{y_i} (1 + \alpha_i \lambda_i)^{-(y_i + 1/\alpha_i)} \left[1 - F_{NB}(0)\right]^{-1} \qquad \text{……………(x)}$$

And,

$$E(Y = Y / X, Y > 0) = \lambda_i \left[1 - F_{NB}(0)\right]^{-1}$$

4.1.1.2 Ordered Logit estimators

In this study, the ordinal trip count variable, categorized according to number of times that an individual has visited the island, is ranked from low to high. And the distance between two categories is not obvious. Thus, the trip count is thought of as providing incomplete information about an underlying number of trips according to the measurement equation;

$$y_i = m \text{ if } \tau_{m-1} \le y_i^* < \tau_m \text{ for } m=1 \text{ to } 6.$$

Number of Individual visits to the site are an ordered response as ">25 times" being the highest number of times the individual has visited the island. We assume that the ordinal trip is related to a continuous, latent variable y_i^* which indicates an individual's trip count. The observed count say y is related to y_i^* according to the following model;

$$y_i = \begin{cases} 1 & if \quad 0 \le y_i^* \le 1 \\ 2 & if \quad 2 \le y_i^* \le 4 \\ 3 & if \quad 5 \le y_i^* \le 9 \\ 4 & if \quad 10 \le y_i^* \le 14 \\ 5 & if \quad 15 \le y_i^* \le 19 \\ 6 & if \quad 20 \le y_i^* \le 24 \\ 7 & if \quad y_i^* \ge 25 \end{cases} \qquad \text{……………(xi)}$$

Where $y_i^* = x_i\beta + \varepsilon_i$ and we assume the errors (ε_i) in our computation structure have logistic distribution with mean 0 and variance $\frac{\pi^2}{3}$, which is expressed as;

$$\text{Pdf : } \lambda(\varepsilon) = \frac{\exp(\varepsilon)}{[1+\exp(\varepsilon)]^2} \quad \text{and} \quad \text{Cdf : } \Lambda(\varepsilon) = \frac{\exp(\varepsilon)}{[1+\exp(\varepsilon)]}$$

……………(xii)

The probability of y_i^* being in the interval of $\tau_{m-1} \le y_i^* < \tau_m$ is expressed as follows;

$$\Pr(y_i = m / x_i) = \Phi(\tau_m - x_i\beta) - \Phi(\tau_{m-1} - x_i\beta) \qquad \text{……………(xiii)}$$

If the observations are independent the likelihood equation is expressed as;

$$L(\beta, \tau / y, X) = \prod_{i=1}^{N} p_i \qquad \text{..............(xiv)}$$

5. Result and discussion

The computer software STATA has been used on estimating all five models. In our analysis, four specifications of count data models, two poisson and two negative binomial models, and one ordered logit model, are employed. Ordered logit model is used to estimate the determinants of past trips to the island and the poisson and negative binomial equations are used to estimate the equations of future visits.

Ordered logit employs the number of past recreational trips to Elmer's Island as a dependent variable. The numbers of individual's past visits are reported in an ordered category as stated in equation *(xi)*. Similarly, poisson and negative binomial equations use the count of expected number of trips to the island in future as their dependent variable in estimation. On an average, individuals have visited the island 2.34 times in their lifetime in the past. While the expected number of visits in the future is reported to be 4.21 on an average in each year. Table 2 contains the summary of variables used in estimation process.

5.1 Count Data Estimation

Estimation of coefficients using all four count data regression models are presented in Table 3. The result shows that most of the variables in the models are significant with expected sign, for all statistical models. Total time spent on recreational trip is treated as two separate variables. First, the time spent for main recreational activities on site has no effect on travel demand. While the travel time to the destination is highly significant. The result shows that the travel time has negative relationship with trip demand indicating increase in travel time decreases the demand for trip to the island.

Contrary to other similar studies, our study shows a total out of pocket expenditure incurred in recreational travel has no impact on demand. The income variable shows that an increase in income increases the trip demand. However, the p-values vary from 0.021 to 0.11 depending upon the models used. The findings are consistent with the results of Hanemann (1987) and Loomis et al. (2000). The truncated poisson and negative binomial models shows the income coefficient is insignificant at 0.05 but significant at 0.10 and 0.11 respectively. Insignificant and negative income coefficients are often encountered in travel cost models. Grogger and Carson (1991) find negative impact of income while estimating fishing demand in Alaska. The negative impact in the study has been rationalized as a preference for other sources of recreation as the income increases. Similarly, Creel and Loomis (1990) finds negative income effect on dear hunting in California too.

Type of visit variable shows statistically significant impact indicating that a change from night to day visit decreases the trip demand by 0.071, 074 and 0.0775 according to different models used (Table 3). Also the trip demand decreases when the purpose of visit changes from incidental or joint to primary. Such result reveals that if the trip is multi-purposed then it increases the demand for recreation. This indicates that individuals prefer multipurpose trip to a single purpose recreation trip.

The study result shows site's physical and environmental characteristics are significantly important on travel decision. Trip demand increases if individual are more concerned with physical characteristics of the site. Increasing importance of food, bed and other physical structures in travel decision increases the demand for the site. On the other hand, the result shows the environmental characteristics of the recreational sites are negatively related to the demand for recreation. Increasing concern over environmental characteristics of recreational sites decreases the demand for recreational trip.

The next variable, the familiarity of respondents with Elmer's Island shows a significant positive response to trip demand for recreation. The coefficients vary from 0.75 to 0.57 (with probability of type I error <0.0001) depending on the models used. However, the awareness of respondent with the condition that the Louisiana state government is purchasing the Island has no impact on recreation demand in the island. This indicates that the demand for the recreation remains the same regardless of whether the state government purchases the property or the private agency purchase the island.

The estimates show that a male is more likely to visit the costal wetlands of Elmer's Island than female. The result is consistent with the finding of Englin & Shonkwiler (1995) who report more hiking demand by males than by females. Thus, the studies suggest male enjoy the outdoor recreation such as hiking and coastal recreation than the female does. Our analysis failed to show significant impacts of age on wetland recreational demand in Louisiana.

For the first time in literature, our study assesses the impacts of flexibility of working hours on individual's recreational trip demand. However the models show the variable is insignificant. Previously, none of the studies have included job flexibility and work hours in their response variables.

5.1.1 Goodness-of-fit of the models

In addition to the coefficient estimations, pseudo R^2 or the likelihood ratio indices ($R^2 = 1 - \ln L/\ln Lo$) are also presented in Table3. Pseudo R^2 analogous to standard R^2 provides the information regarding explanatory power of the maximized log likelihood estimations in a bounded figure between 1 and 0. The R^2 values in our study are smaller indicating that the explanatory power of the model is low. However in social studies, where human behavior is involved lower R^2 is not uncommon.

Likelihood Ratio (LR) test is used to verify if the poisson assumptions of equal mean and variance of dependent variable holds. The likelihood ratio test is normally distributed under the null hypothesis that the mean and variance of y are equal. Result of LR test (Table 3) along with significant alpha in negative binomial estimation for standard count data approach suggests the use of negative binomial models to analyze un-truncated data. However, for truncated count data models the alpha from negative binomial estimation is insignificant. The insignificant alpha indicates that there is no over-dispersion in the data when truncated. Insignificant alpha in negative binomial model suggests the use of poisson is good enough in truncated data sets.

5.2 Ordered Logit Estimations

Table 4 presents the coefficients and marginal values of variables using ordered logit model. This model uses number of individual’s past visits as a dependent variable. As stated in section 6 number of trips are listed in seven categories ranked from lower to higher. Marginal effects of coefficient of the analysis are presented in Table4. The marginal effects describe the impact of variables on costal recreational trip demand ranks. Marginal effects measure the probability of trip demand shift from one rank to other in relation to demographic and other site characteristic variables on question.

Type of visit shows significant positive marginal effect on probability of individual's trip count below 14. As the trip count increases beyond 14, the probability of choosing to take higher number of trips to the island decreases if the recreational trip day trip (Table 4). Purpose of visit also shows the same trend but the marginal effects are not statistically significant. Sites environmental and physical characteristics also have negative impact on probability until the trip count falls with in 14 trips. After the 14 trips, the characteristics have positive effect on probability of choosing to take more than 14 trips to the site. Age, income and other demographic variables also show an opposite effect if the count of the past visits are below 14 trips. Increase in income increases the probability of choosing higher number of trip and lowers the probability of lower number of trips. As in count data model for future visits, the ordered logit shows statistically insignificant impacts of total time spent on site for recreation. In addition, the estimation result indicates that recreation demand in Elmer's Island is unresponsive to the money spent for the recreational trip.

Total expenditure of travel, however, shows insignificant effect on probability of shifting the trip demand from one rank to other. The analysis reports that it has very small negative significant marginal effect on probability choosing to take some specific number of trips to the island. Familiarity has negative effect on probability of choosing to visit less than two times. The familiarity of individuals to the island increases the probability of choosing to visit the island many times. Similarly, increased travel time increases the likelihood of taking fewer trips than taking many trips to the site. One percent increase in two way travel time to destination increases the probability of choosing to take a trip between 2 and four by 2.4% while decrease the probability of choosing to take more than 25 trips by 4%.

Conclusion

In general, this paper analyzes the determinants of recreational demand in coastal Louisiana using ordered logit model. The paper also estimates the demand curve using count data models. Contrary to expectations, all models of our study showed statistically insignificant impacts of total time and positive relation of recreational expenditure to the demand for recreation in costal wetlands. Study shows positive impact on demand which is consistent with the results of Hanemann (1987) and Loomis et al. (2000). The unconvincing estimation associated with, travel cost suggests a careful attention toward the model and/or data. Non randomness of the sample may have contributed toward this result.

The significance of alpha in the standard negative binomial model reflects the level of over-dispersion in un-truncated data. This suggests the rejection of hypothesis of no over-dispersion in the data. This corresponds to the larger value of t-statistics in case of poisson as compared to negative binomial. And our study suggests the use of negative binomial model in estimating recreational trip demand, when observations are not truncated. Finally, the ordered logit estimation results are also consistent with the poisson and negative binomial estimation.

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Table 1: Importance of Environmental Characteristics on Travel Decision

Description	Total Observation	Internet Survey	Intercept Survey
Lack of Pollution	4.77	4.78	4.47
Ease of access to site	4.31	4.31	4.33
Active enforcement of rules	4.15	4.14	4.32
Abundant wildlife	4.12	4.12	4.17
Low human congestion	3.95	3.96	3.87
Catch per trip	3.78	3.08	3.62
Lack of development	3.47	3.47	3.48
Near by/onsite food and lodging	3.25	3.2	3.98
Interpretive signs/naturalists	2.21	2.07	2.84
Camper hookups	2.05	1.98	2.91

Table 2: Characteristics of Variables

Variables	Mean	Std. Dev	Min	Max
Number of past visits	4.171363	2.247993	1	7
Purpose of visit 1=pimary 0=joint+incedental			0	1
type of visit 1= day visit, 2=night visit			0	1
Total time spent in site (hours)	44.04839	36.9221	2	160
Total expenditure(dollars)	381.2934	343.2007	14	2485
Sites physical Characteristics	22.21251	4.440479	7	35
Sites Environmental Characteristics	11.82662	3.355836	2	15
Familiarity 1= Familier 0=not			0	1
No of expected visit in future	4.21070	2.47630	0	10
Travel Time (hours two way)	2.837253	1.012315	0.15	18
Gender 1= Female 0 = Male			0	1
Marital Status 1=married 0=single			0	1
Flexibilty of Job 1= Flexible 2=not			0	1
Income (per year)	3.175676	0.860131	1	4
Age (years)	42.34798	11.07908	18	81

Table 3: Estimated Recreation Demand Curves Based on Count Data Models

Variables	Std Poisson	Std Negbin	Trun Poisson	Trun Negbin
	Coefficients	Coefficients	Coefficients	Coefficients
	P>|z|	P>|z|	P>|z|	P>|z|
Intercept	-1.668355	-1.675743	0.2524128	0.2515422
	0.005	0.006	0.727	0.732
Purpose of visit 1=pimary 0=joint+incedental	-0.0756897	-0.0739213	-0.0717431	-0.0714102
	0.045	0.08	0.061	0.071
type of visit 1= day visit, 0=night visit	-0.1169613	-0.111865	-0.0926941	-0.0915437
	0.008	0.023	0.037	0.046
Total time spent in site (hours)	-0.0000427	0.0000256	0.0000968	0.000117
	0.94	0.968	0.864	0.841
Total expenditure(dollars)	0.000182	0.0001804	0.0001307	0.00013
	0	0.002	0.01	0.013
Sites physical Characteristics	0.0107253	0.0109446	0.0082829	0.008269
	0.023	0.038	0.082	0.092
Sites Environmental Characteristics	-0.0328398	-0.0330042	-0.0295189	-0.0294852
	0	0	0	0
Familiarity 1= Familier 0=not	0.7526428	0.7468575	0.5732201	0.5719451
	0	0	0	0
Awarenes 1=Aware 0=Not	-0.0184	-0.0182	-0.0289	-0.028
	0.5026	0.588	0.2903	0.2632
Travel Time (hours one way)	-0.1184815	-0.117056	-0.0920914	-0.0916803
	0	0	0	0
Gender 1= Male 0 = Female	0.1510858	0.143997	0.1600646	0.1596218
	0.017	0.045	0.012	0.015
Marital Status 1=married 0=single	-0.0639936	-0.0639239	-0.0781279	-0.0779315
	0.162	0.212	0.092	0.103
Flexibilty of Job 1= Flexible 0=not	0.0485527	0.0472066	0.0344531	0.0343048
	0.233	0.3	0.402	0.419
Income (per year)	0.0540601	0.0547465	0.039557	0.0395716
	0.021	0.036	0.1	0.11
Age (years)	-0.0007787	-0.0008728	-0.0012071	-0.0012015
	0.67	0.669	0.515	0.529
Number of observations	695	659	618	618
Pseudo R^2	0.08	0.06	0.05	0.04
Log Likelihoods	-1507.494	-1498.972	-1328.38	-1327.8
LR Chisquare	262.04	192.74	127.37	109.15
	0.000	0.000	0.000	0.000
Alpha		0.0534		0.0124
	N/A	0.000	N/A	0.141

Table 4: Estimated Recreation Demand and Marginal Effects Based on Ordered Logit Model (Past Vis Island)

Variables	Option 1 dy/dx P>|z|	Option 2 dy/dx P>|z|	Option 3 dy/dx P>|z|	Option 4 dy/dx P>|z|	Option 5 dy/dx P>|z|	Optior
Purpose of visit 1=pimary 0=joint+incedental	0.01019	0.01382	0.00383	0.00058	-0.00332	-0.0
	0.39800	0.40000	0.41100	0.54300	0.39600	0
type of visit 1= day visit, 2=night visit	0.04822	0.06157	0.01534	0.00046	-0.01632	-0.0
	0.00300	0.00100	0.00200	0.84600	0.00600	0
Total time spent in site (hours)	-0.00003	-0.00004	-0.00001	0.00000	0.00001	0.0
	0.87400	0.87400	0.87400	0.87600	0.87400	0
Total expenditure(dollars)	-0.00006	-0.00009	-0.00002	0.00000	0.00002	0.0
	0.00100	0.00100	0.00400	0.36700	0.00500	0
Sites physical Characteristics	-0.00203	-0.00273	-0.00075	-0.00010	0.00067	0.0
	0.19300	0.19300	0.20000	0.44500	0.20400	0
Sites Environmental Characteristics	-0.00032	-0.00043	-0.00012	-0.00002	0.00011	0.0
	0.88000	0.88000	0.88000	0.88200	0.88000	0
Familiarity 1= Familier 0=not	-0.75247	0.08455	0.09771	0.11879	0.12535	0.0
	0.00000	0.23900	0.00000	0.00000	0.00000	0
Future visit 1=Yes 0=No	-0.35434	-0.11221	0.03610	0.07219	0.09130	0.0
	0.01700	0.00900	0.22300	0.00800	0.00000	0
Travel Time (hours one way)	0.01784	0.02401	0.00656	0.00087	-0.00589	-0.0
	0.00400	0.00400	0.00800	0.36800	0.01000	0
Gender 1= Female 0 = Male	-0.00416	-0.00567	-0.00159	-0.00027	0.00134	0.0
	0.86400	0.86600	0.87000	0.89200	0.86100	0
Marital Status 1=married 0=single	0.00114	0.00154	0.00042	0.00006	-0.00038	-0.0
	0.94100	0.94100	0.94200	0.94400	0.94100	0
Flexibilty of Job 1= Flexible 2=not	-0.00258	-0.00348	-0.00096	-0.00014	0.00084	0.0
	0.84700	0.84800	0.84900	0.86200	0.84600	0
Income (per year)	-0.01826	-0.02458	-0.00671	-0.00089	0.00603	0.0
	0.01800	0.01800	0.02500	0.38300	0.02800	0
Age (years)	-0.00115	-0.00155	-0.00042	-0.00006	0.00038	0.0
	0.05700	0.05700	0.065	0.39600	0.07000	0.0

Alpha1 | 4.907103 (1.165043)*
Alpha2 | 6.265975 (1.174423) *
Alphaf3| 6.778853 (1.177191)*
Alpha4| 7.302821 (1.179831)*
Alpha5| 7.856867 (1.18233)*
Alpha6| 8.046377 (1.183205)*

(.)* are standard errors of Alpha

Dependent Variable is Past visits