Likelihood of Cruise Ship Passenger Return to a Visited Port

Colleen P. Lynch, Todd M. Gabe, and James C. McConnon, Jr. *

* Authors are former graduate student, Assistant Professor and Associate Professor, respectively, in the Department of Resource Economics and Policy at the University of Maine.

Please direct all correspondences to: Todd M. Gabe; Department of Resource Economics and Policy; 5782 Winslow Hall; University of Maine; Orono, ME 04469-5782; E-mail: todd.gabe@umit.maine.edu; Phone: (207) 581-3307; Fax: (207) 581-4278

Acknowledgments This study was supported by the University of Maine Cooperative Extension, the University of Maine Department of Resource Economics and Policy, the Margaret Chase Smith Center for Public Policy, and the Maine Agricultural and Forest Experiment Station. Surveys were conducted in cooperation with the Bar Harbor Chamber of Commerce. MAFES external publication XXXX.

.

Likelihood of Cruise Ship Passenger Return to a Visited Port

Abstract Cruise ship visits provide an often-overlooked benefit of showcasing port communities to thousands of potential repeat tourists. Using data from a survey conducted in 2002, this study examines the factors that affect a cruise ship passenger's intention of returning to Bar Harbor, Maine. Survey results indicate that one-third of the respondents plan to return to town in the two years following their cruise ship visit. Empirical results suggest that the distance between a respondent's place of residence and Bar Harbor has a negative effect on the likelihood of return. The total number of visits a passenger has made to Bar Harbor and the amount of time spent in port during the one-day visit have a positive effect on the likelihood of return. Finally, household income and the experience of taking a cruise-line sponsored tour do not have a significant effect on a passenger's intention of returning to a visited port.

Likelihood of Cruise Ship Passenger Return to a Visited Port

Cruise lines and their passengers provide an economic stimulus to many areas of the United States. According to the International Council of Cruise Lines, the cruise industry contributed $12.0 billion in direct output to the U.S. economy in 2002, which represents a one-year increase of 8.8% (Business Research and Economic Advisors 2003). This activity supported 109,553 U.S. jobs that paid $3.9 billion in wages and salaries. In recent years, the U.S. cruise industry has also experienced substantial growth in passenger embarkations. U.S. ports handled 6.5 million cruise passenger embarkations in 2002, an increase of 1.2 million embarkations since 2000 (Business Research and Economic Advisors 2003). These indicators of growth in the cruise industry are a cause for optimism in some port communities across the United States.

The town of Bar Harbor, Maine, has emerged as a popular port-of-call on New England cruise itineraries. The number of cruise ship visits to Bar Harbor has increased from 56 visits in 2001 to 87 visits in 2004 (Chapman 2002, Bar Harbor Chamber of Commerce). Cruise ships typically come to Bar Harbor between May and October, with most of the traffic experienced during the autumn months. Along with the economic impacts associated with passenger and crew expenditures made while in port, the cruise industry may provide towns an additional benefit of showcasing the area to thousands of potential repeat visitors. Local businesses and policymakers in Bar Harbor, and similar port towns, may value information on the types of passengers that are most likely to return to the area in the future.

This study examines the factors that affect a cruise ship passenger's stated intention of returning to Bar Harbor. The empirical analysis is based on data from passenger surveys conducted during the 2002 cruise season. Past studies of tourism demand provide a rationale for the inclusion of explanatory variables used in the regression model. Of particular interest are the effects of household income and the distance between a respondent's town of residence and Bar Harbor on a passenger's stated intention of return. The empirical model also controls for factors related to the respondent's experience in port, selected demographic characteristics, and a measure of habit persistence that is represented by the total number of visits a passenger has made to Bar Harbor.

STUDIES OF TOURISM DEMAND

A conceptual analysis of tourism demand begins with understanding the two choices that are made by tourists (Greenidge 2001, Papatheodorou 2001). The first element is the decision to allocate financial and other resources toward tourism services and away from the consumption of other goods, in such a way that maximizes consumer utility. The second element is the choice between multiple tourism services, or destinations, once again governed by utility maximization subject to budget and time constraints. This general conceptual foundation motivates the use of single-equation, time-series models and multi-equation systems of consumer demand in econometric studies of tourism behavior.

In single-equation models, the dependent variable is generally a measure of tourist arrivals or expenditures at a particular destination. This variable is regressed on the

tourist's disposable income and a set of cost factors associated with the area of interest as well as other destinations. These cost factors can include prices of local products, exchange rates and transportation costs (Papatheodorou 2001). Dummy variables may also be included to control for special events or trends, and seasonal aspects of tourism. In multi-equation demand systems, the substitutability and complementarity of an area with other tourism destinations is also incorporated into the analysis (Papatheodorou 2001). These models differ from those that use a single equation in that the system approach explains choices made across multiple tourism destinations (Syriopoulos and Sinclair 1993).

A drawback to the types of tourism demand models described above is that they do not generally incorporate the evolving character of tourism services. The demand for tourism products changes with trends in tourism, the emergence of new destinations and the diminishing popularity of others (Papatheodorou 2001). Additionally, the microeconomic theory upon which these demand analyses are based assumes homogeneity of tourism services. This brings into question the appropriateness of regression models that do not account for heterogeneity that is inherently present across tourism destinations.

An alternative approach that considers the heterogeneity of destinations is the use of a characteristics framework to analyze tourism demand. Attributes of the tourism destination, which may affect the utility gained by an individual tourist, are included in empirical models of tourism demand under the characteristics framework (Morley 1992). This approach assumes that consumption is an activity in which utility is derived

indirectly from the properties of goods, rather than directly from the goods themselves (Lancaster 1966).

Rugg (1973) applied the characteristics framework to tourism demand by adding a time constraint, and modifying the consumer's budget constraint to incorporate transportation costs between alternate destinations. This approach is based on the assumption that a tourist does not gain utility by possessing or consuming travel destinations, but rather by being at the tourism destination for a period of time (Rugg 1973). Time spent in the destination allows for the tourist to experience and enjoy the attributes of that area. Characteristics of a destination may increase utility with time spent at the destination, or the utility associated with a particular attribute may be independent of time.

The studies discussed above, as well as other empirical research on tourism demand, provide a basis for the inclusion of explanatory variables used in our analysis of a cruise ship passenger's intention of returning to Bar Harbor. Explanatory variables generally included in empirical models of tourism demand are measures of income, prices in the destination area, as well as prices in the origin location (Davies and Mangan 1992, González and Moral 1995, Akis 1998). Price can be thought of as either the cost of living at a tourist destination for a given period of time, or as the cost of travel to that destination (Martin and Witt 1988). For instance, in an analysis of the demand for tourism in Texas, Var, Mohammad and Icoz (1990) used the distance between the origin state and the destination (Texas) as a measure of the tourist's travel cost.

ANALYTICAL FRAMEWORK AND DATA

The empirical analysis presented in this study focuses on a cruise ship passenger's stated intention of returning to Bar Harbor. This variable represents tourism demand in terms of a cruise ship passenger's decision to consume a future trip to a visited port. From an underlying conceptual foundation of tourism demand, it would be appropriate to construct an empirical model that estimates a passenger's likelihood of return to Bar Harbor as a function of income, distance between the respondent's place of residence and Bar Harbor, and other selected characteristics. To estimate this model, we will use a binary-choice framework that assumes an individual is faced with a choice between two alternatives (to return to Bar Harbor or not), and that choice is dependent upon a set of identifiable characteristics of the passenger and his or her cruise ship visit in Bar Harbor.

Our regression model uses information from surveys of cruise ship passengers that visited Bar Harbor in 2002. Over seven days between August and October, mail surveys were handed to 2,332 passengers as they returned to the ship after spending the day in port. The survey asked about plans for future travel to Bar Harbor, past visits to the area, the activities passengers pursued while in port, and several personal characteristics. Passengers were surveyed from the Norwegian Sea, Norwegian Dream, Golden Princess, Royal Princess, and the Rotterdam.

We received 1,080 surveys, which translates into an overall response rate of 46.3%. For this study, we focused on respondents that reside within the United States. Thus, we discarded from the sample 88 observations from individuals that live outside the United States or that did not indicate a place of residence. While building the dataset, we also omitted incomplete observations and surveys for which we were unable to match

the place of residence to GIS coverage maps. After making these adjustments, the analysis presented in this study is based on 598 observations. A comparison of descriptive statistics between the overall sample and the final sample of 598 observations did not reveal any noteworthy differences. Table 1 presents descriptive statistics of the dataset used in this study.

The dependent variable used in the model represents a cruise ship passenger's stated intention of returning to a visited port. The variable equals one if the respondent plans to return to Bar Harbor within the next two years, and zero if not. About one-third of the 598 respondents indicated that they expect to return to Bar Harbor within the two years following the cruise ship visit. Explanatory variables include a set of dummy variables that indicate household income, and a continuous variable that measures the distance between the respondent's place of residence and Bar Harbor. The model also controls for the total number of visits a passenger has made to Bar Harbor, the amount of time spent in port during the cruise ship visit, a dummy variable that indicates whether or not the passenger took a cruise-line sponsored tour, and other personal characteristics.

Income is typically included as an explanatory variable in empirical demand studies. Consistent with demand theory, it is expected that household income will have a positive effect on a passenger's stated intention of returning to Bar Harbor. The empirical model incorporates income as a set of dummy variables that indicate ranges of annual household income values. As shown in table 1, 36% of the respondents indicated annual household incomes of $100,000 or more.

Along with household income, price is also thought to be a key determinant of demand. Tourism demand models often use the distance between the tourist's origin

location and the destination, a measure of travel costs, to represent the price of consuming tourism services (Var, Mohammad, and Icoz 1990, Witt and Witt 1991). We assume that travel costs increase with a respondent's distance from Bar Harbor. Thus, individuals living further away from Bar Harbor would be less likely to return than individuals who live closer to the town. We used GIS to compute the straight-line distance between Bar Harbor and the respondents' place of residence, which they indicated on the survey. The average respondent lives in a U.S. city or town that is located 1,297 miles from Bar Harbor

The model also controls for habit persistence and, since 72.9% of the respondents had not made previous visits to Bar Harbor, the passenger's experience in port during the one-day cruise ship visit. Habit persistence can increase the likelihood of returning to a destination if the tourist had previously established a pattern of visiting the destination, and been satisfied with the time spent at the destination (Song and Witt 2000). A measure of habit persistence in this study is the total number of visits, including the cruise ship visit, the passenger has made to Bar Harbor. We expect this variable to have a positive effect on the likelihood of return in the future.

The passenger's experience while in port is used to account for heterogeneity in the tourism product, and also the satisfaction of the tourism consumer (Morley 1992). In this study, the time that the passenger spent in port and the experience of taking a cruise-line sponsored tour are used as proxies for those experiences that may set Bar Harbor apart from other tourism options. Furthermore, Rugg (1973, p. 65) suggests that, "dwelling in the destination allows the traveler to consume destinational attributes or characteristics, such as a pleasant climate or beautiful scenery, from which the traveler

may then derive utility." We expect the time spent in port and the experience of taking a cruise-line sponsored tour to increase a respondent's stated likelihood of returning to Bar Harbor in the future. As shown in table 1, the average respondent spent almost five and one-half hours in port, and 54% of the respondents took a cruise-line sponsored tour of the area.

Other passenger demographic variables included in the model are age, reported in years, and gender, represented by a dummy variable that equals one if the respondent is female and zero otherwise. Finally, the model includes a set of dummy variables that indicate the cruise ship and date of visit. These variables control for weather conditions on the date of visit, the length of the cruise, and other differences across ships not accounted for elsewhere in the model.

EMPIRICAL RESULTS

Table 2 presents empirical results, estimated using a logit regression model, on a passenger's stated intention of returning to Bar Harbor. Given the difficulty in directly interpreting coefficients from the logit model, the right-hand-side column of the table shows marginal effects associated with one-unit increases in the magnitudes of the explanatory variables. The regression results are based on 598 surveys completed by cruise ship passengers that visited Bar Harbor in 2002. Results from a likelihood ratio test (chi-squared = 97.82; significance level = .000) suggest that, as a group, the explanatory variables included in the model have a significant effect on a passenger's stated likelihood of returning to Bar Harbor.

The empirical results provide mixed evidence on the effects of household income and the distance between a respondent's place of residence and Bar Harbor on the stated likelihood of a return visit. Results from a Wald test of joint significance (chi-squared = 0.40, significance level = .526) suggest that, other things being equal, the household income dummy variables do not have a significant effect on a passenger's likelihood of returning to Bar Harbor. On the other hand, as expected, the distance between the respondent's place of residence and Bar Harbor has a negative effect on his or her stated intention of returning to Bar Harbor. The corresponding marginal effect shows that, at mean values, an additional one hundred miles in distance from the passenger's place of residence to Bar Harbor decreases the stated likelihood of return by 1.17 percentage points.

Consistent with the concept of habit persistence, the results indicate that the number of visits to Bar Harbor has a positive effect on the likelihood of passenger return. The corresponding marginal effect suggests that, at mean values, an additional previous trip to Bar Harbor increases the stated likelihood of return by 7.0 percentage points. The amount of time that the passenger spent in port during the cruise ship visit also has a positive effect on the likelihood that they will return to Bar Harbor. At mean values, an additional minute spent in Bar Harbor leads to a 0.0005 percentage point increase in the likelihood of returning to town. This suggests that an additional hour spent in port would increase a passenger's stated likelihood of return by 2.86 percentage points. On the other hand, the experience of taking a cruise-line sponsored tour does not have a significant effect on a passenger's stated intention of returning to Bar Harbor.

The empirical results suggest that the other demographic variables included in the model have a significant effect on a cruise ship passenger's stated intention of returning to Bar Harbor. Other things being equal, female passengers are more likely than male passengers to indicate a planned return to Bar Harbor. Likewise, the age of the respondent has a negative effect on the stated likelihood of return. At mean values, an additional year of age decreases the probability of return to Bar Harbor by 0.37 percentage points. Finally, a Wald test of joint significance (chi-squared = 0.87; significance level = .351) suggests that the dummy variables used to indicate the cruise ship and date of visit do not have a significant effect on the stated intention of passenger return.

CONCLUSIONS AND LIMITATIONS

This study examined the factors that affect a cruise ship passenger's likelihood of returning to a visited port. Results from a survey of cruise ship passengers that stopped in Bar Harbor, Maine, during 2002 suggest that 33.9% of the respondents plan a return trip to the area within the following two years. Applying this percentage to the total capacity (97,190 passengers) of the 64 cruise ships that dropped anchor in Bar Harbor during 2002 (Gabe, Lynch, and McConnon 2003), we estimate that 32,993 cruise ship passengers from the 2002 cruise season returned to Bar Harbor between the fall of 2002 and 2004.

Empirical results, estimated using a logit regression model, suggest that household income does not have a significant effect on a cruise passenger's stated intention of returning to Bar Harbor. On the other hand, the distance between the

respondent's place of residence and Bar Harbor has a negative effect on the likelihood of a return visit. This suggests that the money and time costs of traveling to Bar Harbor may be a deterrent to future visits. The results also indicate that the total number of visits a passenger has made to Bar Harbor increases the stated likelihood of a return trip. This finding, which suggests that patterns of tourism behavior affect future decisions, is consistent with the concept of habit persistence. Finally, the amount of time spent in port has a positive effect on the likelihood of return, while the experience of taking a cruise-line sponsored tour does not have a significant effect on a passenger's stated intention of returning to Bar Harbor.

A potential limitation to the study is that the analysis focuses on a cruise ship passenger's stated intention of returning to Bar Harbor. Information is not available on whether or not the respondents followed through with these intentions. To overcome this limitation, an interesting extension to this study would be to conduct additional survey work to determine the percentage of the Bar Harbor tourist population that had previously visited the area on a cruise ship. Another way to track return tourists would be to provide cruise ship passengers with hotel, restaurant or retail store coupons that are redeemable in future visits. These coupons could be distributed and colleted in a way that provides additional information to local businesses and policymakers on the types of cruise ship passengers that return to a visited port.

REFERENCES

Akis, S. (1998). "A Compact Econometric Model of Tourism Demand for Turkey." *Tourism Management*, 19(1): 99-102.

Bar Harbor Chamber of Commerce. 2004 Cruise Ship Schedule. Retrieved from www.barharborinfo.com/cruisehips_frame.html on July 16, 2004.

Business Research and Economic Advisors (2003). *The Contribution of the North American Cruise Industry to the U.S. Economy in 2002*. Eaton, PA: International Council of Cruise Lines.

Chapman, L. (2002). "Bar Harbor to Welcome Record Number of Cruise Ships." *Bangor Daily News*, May 20.

Davies, B., and J. Mangan. (1992). "Family Expenditure on Hotels and Holidays." *Annals of Tourism Research,* 19(4): 691-699.

Gabe, T., C. Lynch, and J. McConnon. (2003). "The Impact of Cruise Ship Passengers in Maine: The Case of Bar Harbor." *Maine Policy Review*, 12(3): 56-62.

González, P., and P. Moral. (1995). "An Analysis of the International Tourism Demand in Spain." *International Journal of Forecasting,* 11(2): 233-251.

Greenidge, K. (2001). "Forecasting Tourism Demand: An STM Approach." *Annals of Tourism Research,* 28(1): 98-112.

Lancaster, K.J. (1966). "A New Approach to Consumer Theory." *The Journal of Political Economy,* 74(2): 132-157.

Martin, C.A., and S.F. Witt. (1988). "Substitute Prices in Models of Tourism Demand." *Annals of Tourism Research,* 15(2): 255-268.

Morley C.L. (1992). "A Microeconomic Theory of International Tourism Demand." *Annals of Tourism Research,* 19(2): 250-267.

Papatheodorou, A. (2001). "Why People Travel to Different Places." *Annals of Tourism Research,* 28(1)*:* 164-179.

Rugg, D. (1973). "The Choice of Journey Destination: A Theoretical and Empirical Analysis." *The Review of Economics and Statistics,* 55(1): 64-72.

Song, H., and S.F. Witt. (2000). *Tourism Demand Modeling and Forecasting: Modern Econometric Approaches.* New York: Permagon.

Syriopoulos, T.C., and M.T. Sinclair. (1993). "An Econometric Study of Tourism Demand: the AIDS Model of U.S. and European Tourism in Mediterranean Countries." *Applied Economics,* 25(12): 1541-1552.

Var, T., G. Mohammad, and O. Icoz. (1990). "A Tourism Demand Model." *Annals of Tourism Research,* 17(4): 622-626.

Witt, S.F., and C.A. Witt. (1995). "Forecasting Tourism Demand: A Review of Empirical Research." *International Journal of Forecasting,* 11(3): 447-475.

TABLE 1
DESCRIPTIVE STATISTICS [a]

Variable Name	Variable Definition	Mean	Standard Deviation
Return	Equals 1 if the passenger plans to return to Bar Harbor in the next two years; 0 otherwise	0.339	NA
Low Income	Equals 1 if the passenger indicated an annual household income of less than $25,000; 0 otherwise	0.032	NA
Mid-Low Income	Equals 1 if the passenger indicated an annual household income of $25,000 to $49,999; 0 otherwise	0.199	NA
Middle Income	Equals 1 if the passenger indicated an annual household income of $50,000 to $74,999; 0 otherwise	0.239	NA
Mid-High Income	Equals 1 if the passenger indicated an annual household income of $75,000 to $99,999; 0 otherwise	0.171	NA
High Income	Equals 1 if the passenger indicated an annual household income of $100,000 to $149,999; 0 otherwise	0.184	NA
Very High Income	Equals 1 if the passenger indicated an annual household income of $150,000 or greater; 0 otherwise	0.176	NA

Table is continued on the following page.

TABLE 1, CONTINUED
DESCRIPTIVE STATISTICS [a]

Variable Name	Variable Definition	Mean	Standard Deviation
Distance	Distance, in hundreds of miles, from passenger's U.S. city or town of residence to Bar Harbor	12.97	8.28
Bar Harbor Visits	Number of times, including the cruise ship visit, the passenger has been to Bar Harbor	1.67	2.73
Time in Port	Time, in minutes, that the passenger spent in port	326.57	101.06
Tour of Bar Harbor	Equals 1 if the passenger took a cruise-line sponsored tour while in port; 0 otherwise	0.540	NA
Passenger Age	Age, in years, of the passenger	59.38	11.93
Female Passenger	Equals 1 if the passenger is female; 0 otherwise	0.676	NA
Ship 1	Equals 1 for Norwegian Sea, August 28 visit; 0 otherwise	0.117	NA
Ship 2	Equals 1 for Golden Princess, September 18 visit; 0 otherwise	0.149	NA
Ship 3	Equals 1 for Rotterdam, September 29 visit; 0 otherwise	0.130	NA
Ship 4	Equals 1 for Norwegian Dream, October 4 visit; 0 otherwise	0.120	NA
Ship 5	Equals 1 for Royal Princess, October 4 visit; 0 otherwise	0.095	NA
Ship 6	Equals 1 for Rotterdam, October 19 visit; 0 otherwise	0.102	NA

Table is continued on the following page.

TABLE 1, CONTINUED
DESCRIPTIVE STATISTICS [a]

Variable Name	Variable Definition	Mean	Standard Deviation
Ship 7	Equals 1 for Golden Princess, October 22 visit; 0 otherwise	0.174	NA
Ship 8	Equals 1 for Norwegian Sea, October 25 visit; 0 otherwise	0.112	NA

a. Statistics based on 598 cruise ship passenger surveys.

TABLE 2
LOGIT REGRESSION RESULTS: FACTORS AFFECTING A CRUISE SHIP PASSENGER'S STATED LIKELIHOOD OF RETURN TO A VISITED PORT [a]

Variable Name	Estimated Coefficient [b]	Marginal Effect
Constant	-0.589 (-0.605)	-0.129 (-0.606)
Mid-Low Income	0.131 (0.217)	0.029 (0.217)
Middle Income	0.313 (0.522)	0.069 (0.522)
Mid-High Income	0.383 (0.627)	0.084 (0.627)
High Income	0.453 (0.741)	0.099 (0.741)
Very High Income	0.544 (0.884)	0.119 (0.884)
Distance	-0.054*** (-3.832)	-0.012*** (-3.890)
Bar Harbor Visits	0.321*** (3.287)	0.070*** (3.189)
Time in Port	2.18E-03* (1.895)	4.77E-04* (1.900)
Tour of Bar Harbor	-0.196 (-0.950)	-0.043 (-0..952)
Passenger Age	-0.017* (-1.854)	-3.71E-03* (-1.850)
Female Passenger	0.372* (1.741)	0.081* (1.744)

Table is continued on the following page.

TABLE 2, CONTINUED
LOGIT REGRESSION RESULTS: FACTORS AFFECTING A CRUISE SHIP PASSENGER'S STATED LIKELIHOOD OF RETURN TO A VISITED PORT [a]

Variable Name	Estimated Coefficient [b]	Marginal Effect
Ship 2	-0.033 (-0.095)	-7.27E-03 (-0.095)
Ship 3	-0.239 (-0.610)	-0.052 (-0.610)
Ship 4	-0.023 (-0.059)	-5.10E-03 (-0.059)
Ship 5	-1.207** (-2.410)	-0.264** (-2.430)
Ship 6	-0.600 (-1.357)	-0.131 (-1.358)
Ship 7	0.248 (0.738)	0.054 (0.739)
Ship 8	-0.070 (-0.163)	-0.015 (-0.163)
Log-likelihood at convergence	-334.22	
Chi-squared Significance level	97.82*** .000	

a. Estimates based on 598 observations. b. t-statistics are shown in parentheses.
*** Significant at the .01 level. ** Significant at the .05 level. * Significant at the .10 level.