The Impact of Hunting Package Attributes on Hunting Package Prices in Mississippi

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Abstract

Potential economic impacts of hunting activities suggested opportunities for non-industrial private landowners in Mississippi to capitalize on apparent market demand for fee-access hunting. Data were collected from outfitting individuals/firms operating within Mississippi to analyze the impact of hunting package attributes on package prices. Generally, package prices were directly related to the length of the package in days, with the increase in price decreasing with each additional day. Provision of other amenities such as lodging as well as joint activities such as fishing also increased package prices. Finally, there were differences in package prices depending on species being hunted. These results provide landowners with added information about the potential values of hunting package prices, which, when combined with costs of providing the packages, can assist in making optimal enterprise management decisions.

Keywords: hedonic price analysis, attribute values, hunting leases

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Introduction

A survey by the United States Fish and Wildlife Service in 2001 estimated that 82 million residents fished, hunted, and watched wildlife. In pursuing these recreational activities, residents spent over $108 billion, contributing to jobs in related industries and businesses as well as supporting wildlife-related recreation. The money spent on licenses and taxes collected on hunting and fishing activities contribute to many conservation efforts across the United States as well as economic development in rural areas (United States Fish and Wildlife Service [USFWS]).

Residents in Mississippi spent $360 million on hunting expenditures in 2001 (USFWS). Trip-related expenses, which included food, lodging, transportation, and other items, were approximately $132 million or 37% of total hunting expenditures. Food and lodging expenses totaled $73 million. On average, trip-related expenditure per hunter was $370. Hunter's averaged 24 days of hunting per year in 2001. While often difficult to quantify the exact impact, these hunting expenditures provide economic development in small communities. Local businesses, motels, small cafes, gas stations, and grocery stores benefit from the added traffic

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arising from out-of-town hunters and fisherman as suggested by the impact of these patrons on sales tax revenues (Whittington et al.). Guide services, outfitters, and bed and breakfast operations resulting from hunting and fishing activity are also benefiting local economies (Hondur et al.).

Potential economic activity resulting from hunting and fishing activities suggested opportunities for nonindustrial private landowners to capitalize on an apparent market demand for fee-access hunting. Messionier and Luzar noted that, legally, wildlife is considered to be owned by the state and, therefore, cannot be bought and sold. Access to wildlife, on the other hand, can be bought and sold. This access is controlled by private landowners who may gain additional revenue by charging a fee for access to their land. Markets for access to private lands have increased over the years primarily because of overcrowding in the public land areas (Messionier and Luzar). As a result, many hunters are paying a fee to gain access to private lands, the amount of which may depend on amenities or services provided. Landowners who are willing to provide access and interested in fee-access enterprises are limited by the amount of quality information on which to base decisions concerning amenity provision. An economic perspective can be useful in providing landowners with information they need to make an informed decision on whether or not to provide recreational amenities. Results from this study may indicate the type of amenities hunters may find important, which would be useful in enterprise management decisions.

A number of studies have been conducted to elicit values for lease attributes. Gan and Luzar performed a conjoint analysis to analyze waterfowl hunting in Louisiana. Data were collected from a survey of waterfowl hunters and ordered logit was used to estimate willingness-to-pay for recreation experience attributes. This study found that waterfowl hunters evaluated

each available hunting alternative in terms of its attributes. Conjoint analysis was used to model consumer preferences for multi-attribute choices, but this approach is sensitive to design, implementation, and interpretation. In a study by Green et al., the willingness-to-pay for hunting club memberships was estimated using the Contingent Valuation Method (CVM). This study found that the median willingness-to-pay for a permanent membership in a hunting club was estimated to be over $1,290.

Most studies have used hypothetical methods to estimate values of hunting club/lease amenities. According to Lusk, subjects tend to overstate the amount they are willing to pay for a good when hypothetical approaches are used. This study adds to the existing literature on hunting package values by taking a number of fee access hunting providers and examining actual market prices for hunting packages to estimate the marginal value of fee-access hunting amenities. With these market values, the landowner can then make an informed decision on how to manage their fee-access hunting enterprise.

Conceptual Framework

Hedonic theory suggests that consumers, in this case, hunters, derive utility from the attributes possessed by a good, not the good itself (Lancaster; Rosen). In this case, the good is a hunting package, and attributes are amenities contained within that package. Generally, we define the price of a hunting package as:

$$P = f(z)$$

where P is the package price and z is a vector of package attributes. From this formulation, the derivative of the price function with respect to the level of a particular attribute i: $\partial P / \partial z_i$, shows the marginal implicit price, or marginal contribution of that attribute to the hunting package price.

Several variables were hypothesized to impact the price of hunting package attributes:

$$P = f(Days, S, Guide, Lodge, Food, Fish, Trans, TF)$$

where Days were the number of days in the package hunt, S the species being hunted (there may be multiple species hunts), Guide the provision of a guide, Lodge the provision of lodging, Food the provision of food, Fish access to secondary fishing opportunities during the hunt, Trans the provision of transportation to and from the hunting excursion (e.g., an airport), and TF an assessed trophy fee for animals harvested during the hunt. The marginal implicit prices for all attributes except trophy fees were anticipated to be positive. Species marginal values were relative to a base category, and so the sign of the marginal implicit price was only relevant relative to that base.

Methods

Data used in this study were taken from information collected from hunting packages offered by fee access hunting providers operating within Mississippi (see Appendix for sources). Data were retrieved from the Internet and advertisements given for fee-based hunting. The data set consisted of 13 sample firms, which offer 78 different hunting packages. Attributes contained within these packages included number of days being hunted, bag limits, lodging, food, guide service, trophy fees, fishing, photography/birdwatching opportunities, and species being hunted. Packages included one or more species in a given package.

A hedonic model of hunting package prices offered by nonindustrial private landowners in Mississippi was estimated using ordinary least squares. The marginal values of these attributes were estimated from a regression analysis where price is a function of these attributes. The marginal implicit prices of each attribute can be found by taking the partial derivative of price with respect to each individual attribute. Price is a function of these attributes:

$$P = f(D, S, G, L, Food, F, TR, TF, L\alpha)$$

where: D equals the number of days being hunted; S represents the species of the hunt (discussed below); $G = 1$, if guide services are provided, 0 otherwise; $L = 1$, if lodging is provided, 0 otherwise; $Food = 1$, if food is provided, 0 otherwise; $F = 1$, if fishing is provided, 0 otherwise; $TR = 1$, if transportation is provided, 0 otherwise; $TF = 1$, if a trophy fee is present, 0 otherwise; and $L\alpha = 1$, if a bag limit was imposed, 0 otherwise. Species were separated into four groups, one for deer (*deer*); duck/geese (*DG*); quail/pheasant (QP); and boar, turkey, and dove, which were combined and used as the base category.[1] Therefore, all species-specific effects were relative to this base category.

To discern the impacts of the remaining attributes on hunting lease prices, the following equation was estimated using least squares regression:

$$P = (D, Deer, DU, QP, F, TR, TF, L, Food, G)$$

The variables used in the regression analysis were listed with their descriptive statistics in Table 1. A log-linear functional form was used to estimate the model. In a log-linear model, the slope coefficient of the regressors gives the semi-elasticity, which is the percentage change in the regressand for a one-unit change in the regressor. But, this only occurs if the regressor is quantitative. Here, D was the only quantitative variable. All other regressors were dummy variables. For dummy variables, the estimated coefficient represented the marginal impact for the presence of that variable (or, when that dummy variable takes on a value of 1). Finally, the

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[1] Turkey is a key species in Mississippi. However, few of the sampled packages included turkey as a primary hunt species. Thus, it was included in the base category.

log-linear form implies that all effects are multiplicative, not independent. Thus, the marginal impacts of any individual attribute were conditional on the levels of all other attributes.

Results and Discussion

Regression results were reported in Table 2. Overall, the model explained over 84% of the variation in package prices ($R^2 = 0.8414$). Holding all variables at their mean levels found in Table 1, the mean predicted package price was $402.14. Days, fishing, and lodging as well as all species-specific variables were positive and significantly different than zero. The coefficient on days (*D*) has a value of 0.3087, suggesting that package prices increased at a decreasing rate in days. For example, moving from one to two days in the package increased the package price by $70.71, on average. But, increasing from two to three days only increased package price by $48.95, on average. These results suggested that a landowner must carefully consider the cost of adding additional days to hunting packages as the prices clientele paid only marginally increased with each additional day.

Figure 1 shows the marginal impact of the qualitative variables on package price. Provision of lodging increased package prices an average of $258.75. Dividing this by the average number of days suggested that provision of lodging added $96.31 per day to the package price. From a managerial perspective, these results suggested that the provision of lodging must be less than $96 per day to be a profitable investment in the hunting operation.

All species resulted in significantly higher package prices than the dove/boar/turkey only category (*deer, p=0.0001; DG, p=0.0194; QP, p=0.0588*). Interestingly, however, the quail/pheasant category generated the highest additional revenue, which may be due, in part, to a relative scarcity of these species in Mississippi in recent years. Depending on the cost of cultivating these species, these results suggested that landowners may increase hunting revenues

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most dramatically by increasing quail and/or pheasant populations. Finally, access to fishing, as part of a hunting package, increased the package price by $102, on average. Fishing is a relatively low-cost activity for the landowner if they have access to lakes, streams, or rivers. These results suggested that providing access to this activity can significantly ($p=0.0696$) increase package price.

Provision of hunting guides did not significantly affect package prices (p=0.8895). This result suggested that landowners should carefully consider the cost of providing this service as it appears to have no discernable impact on revenue. Providing transportation also does not appear to affect package price (p=0.7389). This result, however, may be related to the fact that over 87% of the packages provided transportation. Thus, the lack of statistical significance may simply mean that transportation was an expected part of the package and, therefore, had no marginal impact on package price.

Conclusions

These results have important implications for nonindustrial private landowners in Mississippi interested in providing fee-access hunting activities. Results suggested that, while having longer hunts in terms of days does add to the package price, price increases at a decreasing rate. Thus, the marginal impact on price for moving from a one to a two day hunt was larger than moving from a two to a three day hunt. Careful consideration to the length of the package must be given to maximize profits.

There were obvious species-specific effects on package prices, with quail/pheasant having the largest marginal impact. The model also suggested that multi-species hunts add more to package prices than single-species hunts. Finally, model results suggested that careful consideration should be given to providing lodging. Results clearly show that lodging adds

significantly to package prices, but the provision of this amenity should cost less than $96 per day, on average, to be profitable.

In all cases, results reported only provide information about potential revenues from providing different amenities in a hunting package. Cost of providing these amenities were not considered. Managers/landowners should carefully consider the cost of providing amenities and compare those with potential revenues before making management decisions. Nevertheless, these results can be used by Extension personnel, management associations, and state agencies to help guide Mississippi landowner decisions related to operating fee-access hunting enterprises.

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Table 1. Descriptive Statistics for Hunting Package Attributes from 13 Sampled Firms

Offering Hunting Packages in Mississippi, 2005.

Variable	Mean	Standard Deviation
P (Price)	984.2307	794.5496
D (Number of Days being hunted)	2.6865	1.6759
Deer	0.5000	0.5031
DU (Ducks or geese)	0.1666	0.3751
DV (Dove)	0.0769	0.2681
QP (Quail or Pheasant)	0.0512	0.2220
Food (Food is available)	0.7564	0.4320
L (Lodging available)	0.8589	0.3503
F (Fishing)	0.5384	0.5018
TR (Transportation)	0.8717	0.3364
G (Guide)	0.4358	0.4991
TF (Trophy Fee)	0.0641	0.2465
Lα (Limit)	4.6794	5.9182

Table 2. Hedonic Price Regression Analysis Results of Hunting Package Prices, Mississippi, 2005.

Variable	Coefficient (Standard Error)	t-statistic
Constant	4.4276* (0.1878)	23.575
D	.3087* (0.0416)	7.420
Deer	0.5399* (0.1339)	4.030
DU	0.3766** (0.1572)	2.395
QP	0.5622*** (0.2924)	1.923
F	0.2555*** (0.1373)	1.860
TR	0.0508 (0.1519)	.335
TF	0.1895 (0.2186)	0.867
L	0.8463* (.2085)	4.058
G	.01652 (.1184)	0.140
Food	-0.0338 (0.1854)	-0.183

* Significant at the $\alpha = 0.01$ level.

** Significant at the $\alpha = 0.05$ level.

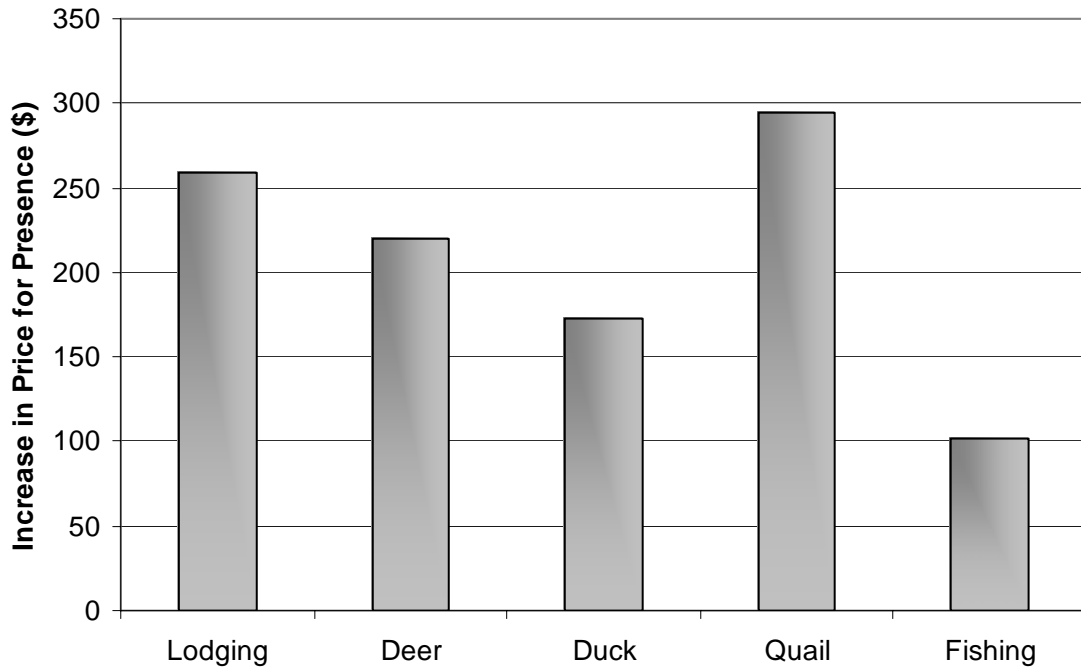*** Significant at the $\alpha = 0.10$ level.

Figure 1. Estimated Marginal Impacts of Qualitative Variables on Hunting Package Prices Derived from a Hedonic Price Model of 13 Sampled Firms Offering Hunting Packages in Mississippi, 2005.

Note: Resulting values show the difference between a package that contains or does not contain the referenced attribute with all other variables held at their mean levels.

Appendix-Sources of Hunting Package Information

Bayou River Outfitters. http://www.bayouriveroutfitters.com. January 13, 2004.

Chilli Creek. http://www.chillicreek.com. January 13, 2004.

Circle Bar Ranch. http://www.circlebar.com. February 05, 2004.

Cypress Lodge. http://www.cypresslodge.com. February 05, 2004.

Giles Island. http://www.gilesisland.com. February 05, 2004.

Hunting Top10. http://www.huntingtop10.com. January 13, 2004.

Mallard Manor. http://www.mallordmanor.com. February 05, 2004.

McKenna's. http://www.mckennas.com. February 05, 2004.

The Panther Tract. http://www.panthertract.com. January 13, 2004.

Tara Wildlife. http://www.tarawildlife.com. January 13, 2004.