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The Demand for Agritourism in the United States

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Using data from the 2000 National Survey on Recreation and the Environment, this study explores factors affecting visits by the American population to farms and the economic value of the rural landscape for farm visitors. The number of farm recreation trip visits was estimated to have an own-price elasticity of −0.43 and an income elasticity of 0.24. Location of residence, race, and gender were found to be important determinants of the number of farm trips. The calculated consumer surplus is estimated at $174.82/trip, of which $33.50 is due to the rural landscape.

Key words: agritourism, demand analysis, value of the rural landscape

Introduction

In addition to producing food and fiber, farms provide other rural amenities to the public. Some of these amenities can be marketed as private goods, whereas others are public goods and do not have a market. One of the marketed amenities is on-farm recreation, also called agritourism, agrotourism, or agritainment. Besides the market goods or services obtained at the farm operations, visitors to farms also receive benefits derived from the scenic beauty generated by the rural landscape.

Previous studies about agritourism in the United States have mainly focused on the motivations of farmers to start agritourism enterprises (e.g., Polovitz-Nickerson, Black, and McCool, 2001; McGehee and Kim, 2004). The literature on the subject of demand for farm recreation is limited; therefore, there is a need for further research in this area. The assessment of the nonmarket benefits of the rural landscape in the United States has not received much attention either. Most of the work in this area has been done for a small region and has focused exclusively on the benefits received by rural residents.

The focus of this study is the recreational value of the rural landscape to farm visitors. Our objectives are to determine and quantify the effects of different factors influencing customers' decisions to visit farms, and to provide an estimate of the recreational value of the rural landscape in the United States.

Agritourism: Definition and Trends

There are many definitions of agritourism or farm tourism. Busby and Rendle (2000) report an evolution of more than 13 definitions of agritourism/farm tourism in the literature.

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While we agree that in order to facilitate the communication among researchers and the general public a clear definition of agritourism is needed, in this study we had to adopt a definition of agritourism consistent with the survey questionnaire used as the source for our data. Therefore, the definition of agritourism utilized here is: "visits to farms, ranches, and other agricultural settings with recreational purposes." In this context, examples of agritourism may include farm stays, pick-your-own produce, Christmas tree sales, hayrides, children's educational programs, petting zoos, and on-farm fishing and hunting.

The recent growth in agritourism is both demand and supply driven. On the supply side, economic pressures have induced farmers and ranchers to augment their income through diversification, both within agriculture itself and through nonagricultural pursuits (Polovitz-Nickerson, Black, and McCool, 2001). On the demand side, people's interest in farm activities has increased in recent years.

It has been estimated that 62 million Americans visited farms one or more times in 2000, corresponding to almost 30% of the population (Barry and Hellerstein, 2004). Several factors are believed to be increasing the demand for agritourism. First, the demand for outdoor recreation in general is rising due to increases in discretionary income. Trends and future projections indicate continued increases in the number of participants, trips, and activity days for outdoor recreation as well as the increase of multi-activity but shorter trips (English, Cordell, and Bowker, 1999). Second, people are doing more traveling as a family, traveling by car and looking for more activities involving recreational experiences (Randall and Gustke, 2003). Finally, there is evidence of growing interest by the public to support local farmers (Govindasamy, Italia, and Adelaja, 2002). This growing interest for rural life has also been observed since the early 1990s in other developed countries such as Japan (Ohe, 2000).

Several factors have led farm families to explore the viability of alternative economic strategies in an effort to preserve the family farm (Rickard, 1983; Fleischer and Pizam, 1997). Agritourism brings diversification opportunities to farmers and ranchers that can help buffer fluctuating markets. It can increase farm revenue and enhance community economic activity. It can provide economically feasible ways to care for natural habitats, natural scenic areas, national resources, and special places (Keith et al., 2003).

Estimates of the U.S. farm income generated from agritourism range from $800 million to $3 billion per year. Even though the percentage of farms with income from agritourism at the national level is only about 2%, in some Midwest states 7% of farms receive income from this activity (Barry and Hellerstein, 2004; Carpio, 2006).

Previous studies about agritourism have focused primarily on the motivations of farmers to start agritourism enterprises.[1] In this study we examine the factors affecting the demand for agritourism in the United States. This information can be helpful to farmers considering an agritourism enterprise and also to development planners who are considering agritourism as an option to promote regional economic development.

The Nonmarket Value of Rural Landscape

The public environmental amenity benefits of rural land have long been recognized. These amenities include wildlife habitats, open spaces, aesthetic scenery, and cultural

[1] An exception to this is a recent study by Tchetchik, Fleischer, and Finkelshtain (2008) that looks at both the demand and supply of rural accommodations in Israel.

preservation (Fleischer and Tsur, 2000). However, given their characteristics of nonexclusivity (available to the general public) and nonrivalry (consumption by one person does not affect consumption by another person), rural land amenities escape adequate consideration by private markets (Bergstrom, Dillman, and Stoll, 1985).

Several researchers have assessed the nonmarket benefits of rural land in the United States, Canada, and Europe. Most of these studies have focused on the valuation of the rural landscape by residents. In a recent survey of the economics literature on the valuation of open spaces by residents, McConnell and Walls (2005) report willingness-to-pay estimates for the environmental amenity benefits of farmland ranging from \$9 to \$239/household/year and aggregate values over households ranging from \$23 to \$1,355/acre/year.

The valuation of the nonmarket benefits of the rural landscape to rural visitors has received less attention. Fleischer and Tsur (2000) measured the recreational use value of agricultural landscape for two regions in Israel combining the travel cost (TC) method with contingent-based information regarding the influence of the agricultural landscape in the visitation decisions. These authors found that the landscape value of farmland is higher than the returns to farming. In the United States, Rosenberger and Loomis (1999) studied the benefits to tourists associated with ranch open space in a resort area in Colorado. To estimate the benefits, they used the TC method and contingent behavior (CB) where respondents are asked how their current visitation would change with a change in site quality. Their findings showed there was no net effect from converting the existing ranchland to urban and resort development uses.

Economic Framework

The decision-making behavior of individuals visiting farms can be analyzed using a two-stage framework. The first stage is the decision to visit farm operations. The second stage involves the number of subsequent visits to farms.

The decision to visit or not visit farms can be analyzed using a random utility model. Under this framework the observed choice between two alternatives is the one providing the higher level of utility (Greene, 2003). Therefore, binary choice models such as the logit or probit formulations can be used to model household decisions to visit or not visit farms with recreational purposes. The choice of this framework for the discrete choice also has an empirical justification since the price or cost of the trips for nonfarm visitors is unknown. For farm visitors, the demand for farm trips can be formulated using the TC method. This method specifies the demand for trips as a function of travel costs, income, and other sociodemographic characteristics of the individual. This framework is justified by the fact that the total price of visiting a farm includes travel expenses and the opportunity cost of traveling to the farm. The demand for visits to farms can be represented by a general travel cost model:

$$ntrips = f(TC, y, \mathbf{d}, \mathbf{q}), \tag{1}$$

where *ntrips* is the number of trips to farms with recreational purposes, *TC* is the implicit price or travel cost to the farm, y is the household income, $\mathbf{d}$ is a vector of demographic characteristics of the group or its representative, and $\mathbf{q}$ is a vector of characteristics of the site.

Value of the Rural Landscape

The method used to value the rural landscape follows closely the method proposed by Fleischer and Tsur (2000). Specifically, this procedure allows measuring the recreational use value of the rural landscape. Other use and non-use values of the rural landscape are not considered here. The following assumptions are necessary in this procedure:

- Assume that different levels of the rural landscape can be represented by an index Rq. This index can be viewed as a weighted sum of the shares of land covered by different landscape characteristics (e.g., land in pasture, farmsteads, orchards, residential areas, etc.).
- The rural landscape affects the demand for farm trips as a demand curve shifter. Therefore, recreational use value can be defined and measured by changes in consumer surplus associated with varying levels of the agricultural landscape index Rq.

Econometric and Empirical Model

An econometric specification that allows us to model farm visitors' behavior in the proposed two-part decision process is the hurdle count model. The hurdle count data model combines a dichotomous model for the binary outcome being above or below the hurdle, and a truncated count model for outcomes above the hurdle. In our application the hurdle is to visit or not visit a farm during the last year. Because of the discrete nature of the number of trips to farms, a count model is necessary for the outcomes above the hurdle (Winkelmann, 2000).

The general formulation of a hurdle count model assumes $f_1(0)$ is the probability of a zero outcome, and $f_2(k)$, $k = 1, 2, 3, \ldots$ is the probability function for positive integers. The probability function of the hurdle-at-zero model is given by:

$$\text{(2)} \qquad \begin{aligned} P(Y=0) &= f_1(0), \\ P(Y=k) &= \left(1-f_1(0)\right)\frac{f_2(k)}{1-f_2(0)}, \quad k = 1, 2, \ldots, \end{aligned}$$

where the term $f_2(k)/(1-f_2(0))$ corresponds to the truncation of $f_2(k)$ at zero since most of the count data distributions have support over the nonnegative integers.

In our application we use the univariate probit model to model the probability of the binary outcome (visit vs. nonvisit) and a negative binomial for the number of trips. The probability function for the negative binomial distribution is:

$$\text{(3)} \qquad P(Y=k) = \frac{\Gamma(1/\alpha + k)(\alpha\lambda)^k(1+\alpha\lambda)^{-(1/\alpha+k)}}{\Gamma(1/\alpha)\Gamma(k+1)k!},$$

$$\alpha \in R^+,\ \lambda \in R^+,\ k = 0, 1, 2, \ldots$$

Since the distributions are conditional on the explanatory variables, a common assumption in the context of count data regression models is to make the parameter λ a function of the explanatory variables. The most common formulation for λ is the log-linear model (Greene, 2003):

$$\ln(\lambda) = \mathbf{x}'\boldsymbol{\beta}, \tag{4}$$

where $\mathbf{x}$ is the vector of explanatory variables and $\boldsymbol{\beta}$ is a parameter vector. The log-likelihood function for the probit-negative binomial model is separable, and hence estimation can be simplified by maximizing the probit model log likelihood using all observations, and then the log likelihood for the truncated negative binomial using the subset of observations for which the counts are possible (Winkelmann, 2000). The separability between the probit and count stages assumes no linkages between the two stages. Several authors have proposed hurdle models that relax this assumption (e.g., Winkelmann, 2004); however, the lack of price information on nonparticipants forced us to use this most restrictive version of the model.

Phanuef and Smith (2005) argue that hurdle models use different data-generating processes to explain the likelihood of consumers being one of three types: nonusers, potential users, or users. The potential user's utility function contains number of trips to the recreational sites but the trip site price is equal to or above his/her choke price. On the other hand, nonusers will never visit a site regardless of the price. This rationality to classify consumers gives alternative interpretations of the hurdle model results. From this perspective, the truncated count model can be viewed as recovering the parameters of the demand function for trips by users and potential users employing only a sample of users. To make this point clear, consider the mean of the truncated negative binomial distribution (Winkelmann, 2000):

$$E(y_i \mid \lambda_i, y_i > 0) = \frac{\lambda_i}{1-(1+\alpha\lambda_i)^{-1/\alpha}}. \tag{5}$$

This equation represents the mean quantity demanded by users. On the other hand, under the assumption that the number of trips follows the negative binomial distribution, if the mean of interest is the mean quantity demanded by both users and potential users, then this mean is expressed as:

$$E(y_i \mid \lambda_i) = \lambda_i, \tag{6}$$

and the truncated model is only used to recover the parameters of the mean of the untruncated distribution.

Endogeneity of the Travel Cost Variable

There is a potential endogeneity problem with the travel cost variable (TC) due to omitted variables (lack of price of substitutes) or because there is measurement error.[2] Although the negative binomial distribution can be characterized as a Poisson-gamma mixture which accounts for unobserved heterogeneity resulting from omitted exogenous variables and/or measurement error in these variables (Cameron and Trivedi, 1998), we consider a recently proposed procedure to explore the endogeneity problem. Specifically, we adopt

[2] The endogeneity of the rural landscape variable (Rq) was also tested using Terza's (1998) approach to deal with endogenous dummy variables on count data models. Statistical tests rejected the null hypothesis of endogeneity. Detailed results of these tests are available from the authors upon request. Also, Lewbel (2007) has shown that measurement error in binary regressors (dummy variables) causes attenuation bias, analogous to the attenuation bias of classically mismeasured variables in linear regression models. Therefore, the direction of the bias is on the conservative side.

the two-stage residual inclusion (2SRI) method proposed by Terza, Basu, and Rathouz (2008) which has been shown to provide consistent parameter estimates in the presence of endogenous regressors. In summary, the procedure proposed by these authors entails the following:

- Estimate an auxiliary regression of the endogenous variable as a function of identified instruments and the remaining variables.
- Use the residuals of the auxiliary regression in the second stage as an additional explanatory variable in the nonlinear regression being estimated.

Consumer Surplus Calculations

The consumer surplus per trip of the groups of users and potential users equals $1/\beta_{TC}$, where β_{TC} is the parameter corresponding to the total cost of the trip variable (Creel and Loomis, 1990). This consumer surplus measures the benefit of the recreational trips to the farms as a whole, of which only a portion originates from the rural scenery. The calculation of the benefit derived from the rural scenery requires the evaluation of the demand without (or at different levels of) the rural landscape. However, the loss of the agricultural landscape is a future contingency for which no actual visitation data are available.

We therefore follow Fleischer and Tsur (2000) and use a hypothetical question regarding the importance of the rural landscape in the decision to visit farms. The question asked to farm visitors was, "In general, when deciding to visit the farm, how important was it to enjoy the rural scenery around the farm?" (such as the variety of animal life, the mixture of crops, or the appearance of farm barns and silos). The interviewees had to select between "important," "somewhat important," and "not at all important." Hence, we define the variable $V_{ij} = 1$ if the individual response was "important," and $V_{ij} = 0$ if the individual response was "somewhat important," or "not at all important."[3]

The component in (4) corresponding to the effect of the rural landscape on the demand for trips can then be written as $V_{ij}Rq\beta_{Rq}$, where Rq is the rural landscape index as explained previously and β_{Rq} is the corresponding parameter. Without loss of generality, we can use the normalizing assumption that the level of the rural landscape is a number between 0 and 1. The actual level of the rural landscape can be set to 1 (i.e., $Rq = 1$) and the index can be set to zero when the rural landscape vanishes.[4]

The effect of the rural landscape on the decision to visit can be measured by the predicted mean of the number of trips and consequently by consumer surplus per visitor per year. This calculation is the predicted mean at the current level and the predicted mean assuming that the rural landscape vanishes, i.e., $Rq = 0$ for all the observations. The change in the consumer surplus under the two assumptions can be viewed as a measure of the benefit of the rural landscape.

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[3] The reason for combining these two categories was empirical. A model including dummy variables for each category separately yielded insignificant effects. Another model including ordinal values for the three categories (0, 1, and 2) yielded very similar results.

[4] This is a first approximation to the value. In practice, every state and even every region will have a different value for the index of the agricultural landscape.

Since imputed values are used in the second stage of the 2SRI procedure, the asymptotic covariance matrix of the parameters in the second step was approximated using a nonparametric bootstrapping procedure as outlined by Wooldridge (2002, p. 379). Ninety-percent confidence intervals for the consumer surplus values were also approximated using this method. A total of B = 999 replications was used to generate the standard errors and confidence intervals.

Data

The data for the estimation of the model come from the 2000 National Survey on Recreation and the Environment (NSRE). This national survey was administered through a partnership between the Forest Service Research Group on the University of Georgia campus in Athens, and the Human Dimensions Research Laboratory at the University of Tennessee in Knoxville. The NSRE's main purpose was to describe and explore participation in a wide range of outdoor recreation activities by people 16 years of age or older in the United States. More information about the survey can be found in Cordell (2004).

The NSRE is one of the few nationwide surveys that includes information about Americans visiting farms. Of the 25,010 NSRE respondents being asked about farm recreation, 7,820 reported visiting a farm—which represents about 31% of the sample. Of the 7,820 "farm visitors," 1,604 were interviewed about farm recreation.[5] The farm recreation module asked respondents about the total number of trips to visit farms, ranches, and other agricultural settings during the previous 12 months.

The random sample of farm visitors who were interviewed about agritourism comprises only 21% of the total number of respondents reporting visiting farms the previous year. Therefore, for the probit analysis, a proportional random sample was obtained from the nonvisitors group. Observations with missing values were deleted from the sample, resulting in a total of 1,524 visitors and 3,411 nonvisitors included in the probit analysis.

For the count regression model, only a subsample of 1,048 individuals was used for the analysis. The observations excluded from this subsample included those with missing values and individuals who traveled more than 500 miles and spent more than $1,000 during the trip. These observations were deleted to ensure that travel was done by car. Moreover, the results were robust to the exclusion of these observations.

The total cost variable (*TC*) or full price includes the monetary costs of the trip plus the opportunity cost of time. Travel costs were estimated by multiplying the distance traveled times the per mile cost of traveling by car. The AAA estimated that in 2000 the average cost per mile of driving an automobile was 49.1¢. The opportunity cost of time or value of time is assumed to be one-third of the wage [i.e., $\rho = (\frac{1}{3})w$][6] (Phaneuf and Smith, 2005). To calculate the per hour wage, a total of 1,841 hours of work per year was assumed (Organization for Economic Cooperation and Development, 2007). The trip time was obtained by dividing the distance traveled by an average speed of 55 miles/hour.

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[5] Our numbers differ slightly from those presented by Barry and Hellerstein (2004), who also provide a very detailed presentation of the results of the survey.

[6] Models specifying ρ as a function of employment status, income, and the agricultural landscape yielded insignificant results.

Table 1. Summary Statistics of Variables Used in the Probit Analysis and the Count Regression Model of Number of Trips to Farms

	PROBIT MODEL		
Variable	Visitors (n = 1,524)	Nonvisitors (n = 3,411)	COUNT MODEL (n = 1,040)
Number of Trips			10.29 (15.38)
Cost of Trip (round-trip, $)			87.93 (45.42)
Distance to the Farm (round-trip, miles)			126.64 (188.10)
Importance of the Rural Landscape			0.77 (0.42)
Years of Education	14.05 (2.62)	13.61 (2.75)	14.16 (2.57)
Black	0.05 (0.21)	0.08 (0.27)	0.04 (0.19)
White	0.93 (0.25)	0.89 (0.32)	0.94 (0.24)
Hispanic	0.05 (0.22)	0.08 (0.28)	0.04 (0.20)
Male	0.45 (0.50)	0.42 (0.49)	0.46 (0.50)
Age (years)	42.84 (15.50)	46.05 (17.65)	42.86 (14.93)
Family Income ($)	58,014 (34,525)	53,879 (34,897)	57,977 (33,750)
Live in Urban Area	0.62 (0.49)	0.67 (0.47)	0.60 (0.49)
Household Size	2.89 (1.53)	2.64 (1.54)	2.95 (1.53)
Presence of Children < 6 Years of Age	0.23 (0.42)	0.16 (0.37)	0.26 (0.44)
Student	0.09 (0.29)	0.09 (0.29)	0.07 (0.26)
Retired	0.16 (0.37)	0.23 (0.42)	0.16 (0.36)
Homemaker	0.17 (0.37)	0.19 (0.39)	0.18 (0.38)
Employed	0.70 (0.46)	0.63 (0.48)	0.71 (0.45)

Note: Values in parentheses are standard errors.

Table 1 presents the description of the variables included in the binary choice model for the decision to visit or not visit a farm, and the variable considered in the Poisson model for the annual number of trips to a farm. The demographic variables are the same for both models. However, because no information is available about farm trips for nonvisitors, the variables related to farm trips are not included in the binary choice model. The mean in the probit model can be interpreted as a reduced form of a model in which prices represent quality differences caused by heterogeneous commodity aggregation and the household characteristics are a proxy for household preferences over unobservable quality characteristics (e.g., Davis and Wohlgenant, 1993).

Table 1 also presents the summary statistics of the variables used in the probit analysis and the count regression model of the annual number of trips to farms. While we have not tested for statistical differences, the values of the variables in the farm visit and nonvisit groups are very similar. When comparing the average farm visitor and the average nonvisitor, the average farm visitor is more educated, has a higher family income, is younger, and belongs to a household with more family members. The group of farm visitors includes a higher percentage of visitors who are white, male, living in the rural area, employed, and with children under six years old.

The average number of trips to farms by visitors is 10.3 with an average cost of $88 per trip and an average distance traveled to the farm of 126 miles. The values of the socioeconomic characteristics of the visitors are similar to those presented in the probit model.

In the implementation of the 2SRI procedure, we used the constructed trip cost variable (potentially endogenous variable) as the dependent variable in the OLS auxiliary regression. As explanatory variables, we used a self-reported cost of the trip, household size (as instruments), and the remaining exogenous variables included in the count data model (except Rq) (see table 4).

Results and Discussion

Probit Model

The results of the probit analysis modeling the decision to visit or not visit a farm are reported in table 2. The value of the parameters and marginal effects corresponding to dummy variables are relative to an individual with characteristics of the dummy variables not included in the model (unemployed; race other than white and black; non-Hispanic origin; female; living in the rural area; with no children under six years of age; and who is not a student, retired, or a homemaker). Relative to the baseline respondent, a respondent who is white is almost 10% more likely to visit a farm. In contrast, a customer who is Hispanic is 13% less likely to visit a farm. Someone living in the urban area is 5% less likely to visit a farm. Finally, the presence of children under six years old makes a household 4% more likely to visit a farm.

The marginal effects of the continuous variables represent the change in the probability of choosing an alternative with respect to a one-unit change in the variable. Each additional person in the household increases the probability that the person will visit a farm by about 1%. The positive effect of the presence of children in the household and the household size in the decision to become a farm visitor reflect the nature of this activity as suitable for family and children. An increase in one year in the age of the respondent decreases the probability of visiting farms by only 0.2%. The marginal effect with respect to income implies that a 1% increase in income increases the probability of visiting a farm by 0.07%. The marginal effects of the other variables included in the model are not statistically significant, nor are they economically important.

Table 2. Results of the Probit Analysis for the Decision to Visit Farm Operations with Recreational Purposes

	Parameter		Marginal Effect	
Variable	Coefficient	Std. Error	Coefficient	Std. Error
Intercept	−0.600***	0.162	−0.210***	0.056
Employed	0.074	0.062	0.026	0.021
Black	−0.095	0.141	−0.032	0.047
White	0.303**	0.121	0.098***	0.036
Hispanic	−0.408***	0.079	−0.128***	0.021
Male	0.220	0.040	0.008	0.014
Age	−0.006***	0.002	−0.002***	0.000
Family Income ($10,000s)	0.011	0.006	0.004	0.002
Live in Urban Area	−0.130***	0.040	−0.046***	0.014
Presence of Children < 6 Years of Age	0.114**	0.579	0.040*	0.021
Household Size	0.034**	0.015	0.012**	0.005
Student	−0.104	0.079	−0.036	0.026
Retired	−0.019	0.079	−0.006	0.027
Homemaker	−0.006	0.061	−0.002	0.021
Log Likelihood			−3,029.34	
Pseudo-R^2			0.02	

Note: Single, double, and triple asterisks (*) denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Count Regression Model

Table 3 shows the results of the count regression models. Two models are presented. Model 1 is a truncated negative binomial model and model 2 is the 2SRI truncated negative binomial accounting for endogeneity of the travel cost variable (table 4 shows the first-stage OLS estimates). In both models, the rejection of the null hypothesis that $\alpha = 0$ indicates that the data display overdisperison (i.e., the variance is higher than the mean). Therefore, the negative binomial is more appropriate than the Poisson model.

The likelihood-ratio test testing the null hypothesis that model 1 is equal to model 2 is rejected at the 5% significance level, which provides some evidence of the presence of endogeneity. This result also suggests the 2SRI truncated negative binomial is the superior model. Hence, model 2 is used for the discussion of results and the consumer surplus calculations.

As expected, the cost of the trip has a negative effect on the number of trips. The effect of the travel cost variable expressed in elasticity terms indicates that a 1% increase in travel costs causes a 0.43% reduction in the number of trips. The marginal effect of income translated to elasticity indicates that a 1% increase in income increases the average number of trips by 0.24%.[7, 8] Age and years of education have a quadratic effect

[7] These elasticities were calculated using the mean quantity demanded by both users and nonusers [equation (6)] estimated at 5.3 trips/year.

[8] Phaneuf and Smith (2005) present a summary of price and income elasticities from recreation demand studies (e.g., fishing, sailing, beach recreation, camping, hunting, etc.). Six of the seven income elasticities and 18 of 25 own-price elasticities reported are inelastic.

Table 3. Results of the Count Regression for the Number of Recreational Trips to Farms

	MODEL 1 Truncated Negative Binomial		MODEL 2[a] Truncated Negative Binomial + 2SRI	
Variable	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Intercept	−0.613	−3.263	−0.257	−1.368
	(1.362)	(4.817)	(1.620)	(8.708)
Trip Cost	−0.004***	−0.020	−0.005***	−0.027***
	(0.001)	(0.006)	(0.002)	(0.011)
Importance of the Rural Landscape	0.350***	1.861	0.349**	1.860**
	(0.123)	(1.432)	(0.151)	(0.817)
Family Income ($1,000s)	0.003*	0.014	0.005**	0.023**
	(0.002)	(0.019)	(0.003)	(0.014)
Years of Education	0.261*	1.386	0.237	1.260
	(0.176)	(7.540)	(0.213)	(1.155)
(*Years of Education*)^2	−0.010**	−0.053	−0.009*	−0.047
	(0.006)	(0.054)	(0.007)	(0.039)
Black	−0.418	−2.222	−0.428	−2.279
	(0.445)	(4.000)	(0.494)	(2.658)
White	0.188	1.001	0.152	0.810
	(0.363)	(3.910)	(0.371)	(1.988)
Hispanic	−0.349*	−1.855	−0.296	−1.577
	(0.253)	(2.275)	(0.295)	(1.584)
Male	0.496***	2.637	0.517***	2.753***
	(0.113)	(1.271)	(0.118)	(0.668)
Age	0.030***	0.158	0.026	0.137
	(0.008)	(0.175)	(0.024)	(0.130)
Age^2	0.000	−0.002	−0.001	−0.002
	(0.000)	(0.001)	(0.001)	(0.002)
Live in Urban Area	−0.823***	−4.380	−0.784***	−4.177***
	(0.108)	(0.498)	(0.118)	(0.716)
Presence of Children < 6 Years of Age	−0.185*	−0.986	−0.233*	−1.238*
	(0.133)	(1.156)	(0.154)	(0.818)
Student	0.101	0.537	0.068	0.363
	(0.214)	(1.974)	(0.250)	(1.343)
Retired	0.066	0.352	−0.086	−0.459
	(0.183)	(1.694)	(0.256)	(1.368)
Homemaker	0.204*	1.086	0.188	1.000
	(0.148)	(1.399)	(0.166)	(0.881)
First-Stage Residual	—		0.004*	0.019*
			(0.003)	(0.012)
Dispersion Parameter (α)	3.374***		3.335***	
	(0.489)		(0.435)	
Log-Likelihood Function	−3,207.6		−3,205.8	
N	1,040		1,040	
Log-Likelihood Ratio	3.6 (p = 0.05)			

Notes: Single, double, and triple asterisks (*) denote statistical significance at the 10%, 5%, and 1% levels, respectively. Numbers in parentheses are standard errors.

[a] Standard errors in Model 2 were calculated with the asymptotic covariance obtained using bootstrapping.

on the number of trips. This indicates that the number of trips increases as the age and years of education increase, reaches a maximum, and then the number of trips decreases with further increases in age or years of education. The age at which the number of trips is a maximum is 42.8 years, and the years of education at which the number of trips is a maximum is 13.1 years of education.

The variable corresponding to the importance of rural landscape indicates that people who consider the rural landscape an important factor when deciding to visit a farm operation make more trips to farms than people who consider the rural landscape unimportant. Specifically, people who consider enjoying the rural scenery around the farm as "important" make on average 1.9 more trips than people who believe enjoying the rural scenery is "somewhat important" or "not at all important."

The marginal effects of the parameters corresponding to dummy variables in this model are also the effects relative to an individual with characteristics of the dummy variables not included in the model (unemployed; race other than white and black; non-Hispanic origin; female; living in the rural area; with no children under six years of age; and who is not a student, retired, or a homemaker). Relative to this type of respondent, an individual who is Hispanic will make 1.6 less trips. People living in the rural area will make on average about 4.2 more trips to farms than those living in urban areas. Male respondents make on average 2.8 more trips than females. Being a homemaker also has a positive effect on the number of trips relative to the baseline respondent, making about one more trip to farms compared to the baseline respondent. Other variables were not statistically significant or economically important with the exception of the dummy variable for black respondents, indicating that on average black visitors make two less trips compared to the baseline respondent.

Initially, it had been hypothesized that people living in urban areas had a stronger affinity for farm visits, but the regression results revealed the opposite. This finding might be explained by the fact that the recreational choice set of people living in urban areas is larger than the choice set of people living in rural areas. In addition, although 20% of the U.S. population live in rural areas, only 1% are directly employed in agriculture. Hence, there are a large number of people living in rural areas who do not have a direct connection with agriculture. With a smaller number of entertainment options available, they are more likely to participate in agritouristic activities.[9]

The various impacts of the different sociodemographic characteristics, and especially the effect of the location of customers, have important implications for agritourism marketing efforts. For example, even though the number of potential agritourism customers living in urban areas is larger than the potential market in rural areas, our results suggest that marketing efforts targeted toward rural customers might be more effective.

Consumer Surplus

The results of the calculations of consumer surplus are presented in table 5. The estimated consumer surplus is $174.82 per trip, of which $33.50 is due to the rural landscape. This value indicates that around 17% of the consumer surplus would be

[9] A reviewer suggested that the location dummy variable might reflect additional information on distance. Visitors living in urban centers not only travel a longer distance, but they have to fight the traffic, which can be taxing timewise. Thus this variable might have a similar effect to travel cost.

Table 4. Results of the Two-Stage Residual Inclusion (2SRI) OLS Auxiliary Regression

Variable	Coefficient	Standard Error
Intercept	125.86	106.75
Self-Reported Trip Cost	0.16***	0.02
Family Income ($1,000s)	0.55***	0.14
Household Size	−5.54**	3.25
Years of Education	−7.12	13.83
(Years of Education)^2	0.32	0.45
Black	−6.89	34.04
White	−10.60	28.04
Hispanic	15.90	19.67
Male	4.48	8.42
Age	−1.55	1.63
Age^2	0.03*	0.02
Live in Urban Area	8.68	8.28
Presence of Children < 6 Years of Age	−11.14	10.86
Student	−3.64	17.77
Retired	−44.52***	16.52
Homemaker	−0.18	11.23
R^2	0.15	

Note: Single, double, and triple asterisks (*) denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 5. Consumer Surplus of Farm Trips

Item	Visitors
Trips Quantity Demanded	10.3
Consumer Surplus ($ per trip)	174.8 (98.3–427.3)
Consumer Surplus Due to Rural Landscape Only ($ per trip)	33.5 (9.7–88.8)
Estimated Number of Visitors per Year (millions)	62
Total Consumer Surplus Due to Rural Landscape ($ billions/year)	21.4
Total Net Farm Income (1990–2000 average, $ billions/year)	48.2

Notes: Numbers in parentheses are the bounds of 90% bootstrapping confidence intervals. Total consumer surplus was obtained by multiplying number of visitors times the estimated per visitor consumer surplus and times the average number of trips demanded.

generated by the rural landscape. Because of the nature of the activity, visits to farms are likely to be made with the rest of the family. Therefore, these estimates are likely to correspond to consumer surplus "per family." Unfortunately, the survey did not include a question asking respondents about the size of the visiting party to the farm. If we use the average family size of 2.95, the consumer surplus per person per trip is $59.30.

In Israel, Fleischer and Tsur (2000) estimated values of \$925 and \$514 for the per trip consumer surplus in two regions of that country and \$167 and \$49 for the corresponding per trip agricultural landscape-induced surplus. Rosenberger and Loomis (2000) present a summary of 682 estimates of average consumer surplus values per person from recreation demand studies. Consumer surplus per person estimates in 1996 dollars range from \$1.05 for sightseeing to a maximum of \$263.68 for float boating. Therefore, our estimates are within the range of previous estimates of consumer surplus for other types of recreational activities and well below the estimates of Fleischer and Tsur (2000) regarding agritourism.

Using the estimated 62 million visitors to farm operations and the predicted 10.3 visits per individual, the total consumer surplus derived from the rural landscape was estimated to be \$21.4 billion per year. This value is about half of the average total net farm income in the United States over the past 10 years. Fleischer and Tsur (2000) and Drake (1992) found that the landscape value of farmland is far in excess of returns to farming in Israel and Sweden, respectively.

Concern over farmland losses in the United States has generated increasing support for farmland preservation programs. According to Irwin, Nickerson, and Libby (2003), \$1 billion was allocated for funding agricultural easement programs in the 2000 elections at the state and local levels. In 2002, the U.S. Congress authorized another \$1 billion in new funding for the federal Farmland and Rangeland Protection Program. The results of this study suggest that the public support for preservation programs might also be linked to the benefits obtained by tourists from the scenic attractiveness of working farms.

Robustness of Results to Model Assumptions

The calculation of the consumer surplus measure using the parameter estimates of a demand model including income is theoretically dubious since the consumer surplus measure is not path independent. Path dependence implies that the measure of consumer surplus is not unique. However, given the fact that the percentage of income spent on farm trips is very small (less than 1% on average) and the income elasticity is also small, the errors incurred in using consumer surplus as a measure of the more theoretically appealing equivalent or compensating variations are minor (Just, Hueth, and Schmitz, 2004).

The survey also included a question where people were asked if they would change the number of trips taken to the farm if the cost of the trip was to increase by a given amount (different values for different respondents). They were given the option to choose between no change, 1 less trip, 2 less trips, no trips, and other. An estimate of the change in the number of trips, estimated by a dollar increase in the trip cost, can be obtained by dividing the stated change in the number of trips by the assumed change in the trip costs. Mathematically this can be expressed as follows:

$$(7) \qquad \Delta \textit{ in the number of trips by a dollar increase in trip costs} = \frac{\Delta \textit{ Number of Trips Taken}}{\Delta \textit{ Cost of the Trip}}.$$

The calculated average of this variable was estimated as 0.030, which is close to the estimated marginal effect of travel costs in the travel cost demand model.

Summary and Conclusions

Using data from the 2000 National Survey on Recreation and the Environment, this study has explored factors affecting American population visits to farms, and the economic value of the rural landscape for farm visitors.

The average number of trips to farms demanded by visitors is 10.3 trips per year. The analysis of the factors influencing the decision to become a farm visitor indicated race and location of residence as the most important characteristics explaining this decision. The mean price elasticity of the number of farm recreation trip visits was estimated to be −0.43, and the income elasticity was estimated to be 0.24. Location of residence, race, and gender were found to be important determinants of the number of farm trips. This information is useful to farmers considering starting an agritourism enterprise and also to development planners who are considering agritourism as a way to promote regional economic development. However, because agritourism consists of a variety of activities, further research is required to identify the factors affecting the decisions to visit specific types of agritouristic activities.

Because of the characteristics of nonexclusivity and nonrivalry, the public good value may exceed the market value of rural land amenities. Previous studies on rural amenities have mainly focused on the economic value to residents. In this study we estimate the economic value of the rural landscape to visitors. The calculated consumer surplus is estimated to be $174.82 per trip, of which $33.50 is due to the rural landscape. The total consumer surplus generated from the agricultural landscape was estimated to be $21.4 billion, which is about half of the U.S. net total farm income average. Although our consumer surplus measures are imprecise, we must conclude that there is something important happening with regard to the visitors' economic valuation of farm amenities, thus requiring continued and closer scrutiny.

The results of this study suggest that the public support for preservation programs might also be linked to the benefits obtained by tourists from the scenic attractiveness of working farms. These results can also be used by policy makers to assess the relative importance of farmland-specific amenities versus more general rural amenities such as forests or wetlands.

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