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Tourists' Value of Ranch Open Space Over Time: A Panel Data Estimation

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INTRODUCTION

Natural amenities, such as scenic viewsapes, are clearly thought to provide an integral component of recreation, tourism, amenity migration and retirement development (Bennett, 1996; Frederick, 1993; Jakus *et al.*, 1995; Keith and Fawson, 1995; Keith *et al.*, 1996; Marcouiller, 1997; Marcouiller and Clendenning, 2005; McDonough *et al.*, 1999). They provide the substantive but latent primary factor input into tourism industry output (Marcouiller, 1998; Marcouiller and Clendenning, 2005; Power 1988). Tourism is one of the world's largest and fastest growing industries (Wall, 1997). In addition, local natural amenities impact local economic development via drawing tourists who want to enjoy the local amenities and who spend their money supporting the local businesses. The tourists stimulate the local economy in that they bring additional income into the economy from outside the region that can then circulate within the local economy (Power, 2005). Tourism can serve as a large source of income to a region's economy.

Although markets accurately reflect the private and social value of many goods and services, they tend to undervalue tourism and outdoor recreation experiences for at least two significant reasons. First, where the natural features of a landscape are the principal draw for tourism, those features are relatively unique, creating a more inelastic demand curve than one observes for commonly purchased items. As a result, the consumer's surplus (or the value of the good or service that is not captured by the price) will be greater for nature based tourism experiences than for apples and oranges. Secondly, recreational experiences, tours or other tourist services purchased by tourists on vacation are jointly produced (or bundled) with a variety of potentially valuable attributes demonstrating public goods characteristics. These attributes, potentially including, for example, rural lifestyle, clean air, scenic landscapes and friendly

people, contribute to the tourism experience and may be affected (enhanced or diminished) by local policy. The attributes involved in the tourism experience are not captured or directly illuminated by market transactions. Alterations in these features could either increase or decrease the amount of tourism activity in the local community. This would have an impact on the local economy contiguous to the tourist destination. Therefore, policies that either directly or indirectly affect the tourism industry need to take into account how the amenities may influence a tourist's experience because of the potential impact this could have on the local economy.

The attributes associated with a tourist destination could be such things that a tourist neither consumes nor possesses. Therefore, the surroundings of a tourist destination would have the same properties of a public good. Since public goods cannot be purchased in a market type setting, one cannot use market prices to derive values of public goods. An indirect market or nonmarket valuation method needs to be employed in situations when market prices are not available. Specifically, for the case of goods that can neither be consumed nor possessed yet directly contribute to the tourism experiences possess nonconsumptive use values. Nonconsumptive use values are attributed to values associated with using a resource without actually consuming that resource, such as viewing a scenic landscape.

STUDY SITE: ROUTT COUNTY, COLORADO

Steamboat Springs, the county seat of Routt County, Colorado is a unique community and tourist destination, possessing a distinctive Rocky Mountain landscape, plentiful outdoor recreation, culinary and cultural opportunities and a long tradition of the "Old West." Cattle ranching and its related industries has long been a central feature of Routt County's private land use and community culture. In recognition of the contribution of working landscapes to the well

being of the community, Routt County implemented a voluntary purchase of development rights program in order to help to preserve this traditional lifestyle in the county's vast valleys in 1995. We can infer that landowners and residents certainly benefit from the local protection of ranch open space. What remains unclear is to what extent visitors to Routt County appreciate the working landscape attributes of the region. Moreover, if ranch open space contributes to the Routt County tourism experience, then ranchers and the broader community may be subsidizing the local tourism industry through their land stewardship and land conservation policy. The purpose of this study is to estimate tourists' nonconsumptive use values of ranchland open space over the decade since the implementation of the voluntary purchase of development rights program.

ESTIMATING DEMAND FOR NATURAL AMENITIES ACROSS TIME

Tourists' motivation to travel to a particular destination varies by individual. The modes of travel, length of stay and expenditure patterns also differ across tourists. It is important for a tourism community to understand what attracts tourists' to their region. Over time, as people have different experiences, or come to know a place better, their preferences may evolve. This in turn may lead to different motivations behind visiting a particular region as a travel destination. In order to capture tourists' attitudes toward these amenities over time, information regarding tourists' traveling behavior, expenditures and willingness to pay for these amenities need to be analyzed over multiple years. Further, these fluctuations could translate into varying levels of economic activity into the region. In order to capture tourists' values over time, surveys need to be conducted in multiple years.

Loomis (1989) resurveys the same households and visitors to Mono Lake over the span of nine months to test the reliability of the contingent valuation method. The survey was distributed as a mail survey. Loomis (1989) concludes that the contingent valuation method provides stable and reliable willingness to pay values over time. Reiling *et al.* (1990) extends this research by incorporating seasonality in order to test temporal reliability of the contingent valuation method. Specifically, Reiling *et al.* (1990) conducts a household mail survey during peak fly season and after fly season in regards to black flies along Penobscot River in Maine. Different households received the surveys in the two stages; however, the descriptive statistics between the samples were not statistically different. Reiling *et al.* (1990) finds no statistical difference among willingness to pay values and concludes that the contingent valuation results are reliable and do not vary with time. Both of these studies used mail surveys while this study uses intercept surveys. Further this research evaluates different values over a greater span of time compared to the studies carried out by Loomis (1989) and Reiling *et al.* (1990).

Magnan (2005) uses mail surveys to determine residents' economic value of ranch open space in Routt County. In addition, Magnan (2005) uses comparative statistics to determine whether differences exist among residents' demographics, attitudes, preferences and willingness to pay values from 1993 to 2004. He concluded that Routt County residents are changing, demographically; however, their preferences remain constant in regards to ranchland open space. Further, it was determined that willingness to pay values increased slightly from 1993 to 2004. This research will evaluate if there is a statistical difference among tourists' demographics, travel behavior, travel expenditure, attitudes, preferences and willingness to pay values in regards to ranchland open space in Routt County using an intercept survey. This research will combine the independent cross sections from the two different years and test for statistical difference among

responses. The objectives of this study are to evaluate, compare and model tourists' demographics, travel behavior, preferences and values associated with preserving rangeland open space in Routt County, Colorado from two valuation surveys separated by a decade of experience and change.

DATA AND METHODOLOGY

Data Collection

The intent of our sample frame is to represent summer tourists to Routt County. Summer tourists of 2005 were randomly intercepted at seven different locations throughout Routt County from early July through mid September of 2005. Surveys were randomly distributed during weekends and weekdays. Survey collection areas were equally distributed among three main locations: the airport (32.3%), the visitor center at Steamboat Lake (28.8%) and locations around the town of Steamboat Springs (38.9%). The survey crew consisted of Colorado State University graduate students, who were visibly identifiable as such. The survey was four pages in length and was completed by the tourist in approximately 15 minutes.

The data for the summer tourists during 1993 was obtained through the intercept of every fifth adult entering one of several locations throughout Steamboat Springs, on stratified random days, with half on the weekend and half on weekdays, during the afternoon. The surveys were conducted as an in-person, intercept interviews. The interviews were conducted by a professional survey firm as part of the annual summer visitor for the Steamboat Springs Chamber of Commerce (Rosenberger and Loomis, 1999). Potential survey respondents for both data sets were filtered by a series of introductory questions in order to establish that they were adults and non-residents of Routt County.

Survey Format

The surveys administered in 1993 and 2005 asked many of the same questions in order to facilitate a comparable analysis. Specifically, respondents were asked about their trip activities, preferences about natural and man-made assets, reasons for maintaining open space, length of their trip and general demographic questions. In addition, travel cost, contingent valuation and contingent behavior questions were included in both surveys. A total of 403 surveys were completed during the summer of 1993 and a total of 420 surveys were completed for the summer of 2005.

Model Specification and Hypotheses

The contingent behavior and the contingent valuation models are employed in order to quantify tourists' values of ranchland open space. The contingent valuation portion of the survey asks if existing ranchlands had changed to urban uses, would it make the respondent's vacation experience worth fewer (or more) dollars per day. The respondent could state whether it would be worth fewer dollars per day, no effect on daily spending or worth more dollars per day. If the respondent stated it would cause their tourist experience to be worth more (or fewer) per day, they were then asked to specify how much more (or less) per day it would be worth.

The contingent behavior portion of the survey is similar to that of the contingent valuation portion as it asks a two part contingent behavior question. The difference between the contingent questions is that the contingent behavior portion of the survey inquires if the respondent would visit the Steamboat area fewer (or more) days if the existing ranch lands were converted to urban uses. Further, the respondent was asked to specify how many fewer (or

more) days they would visit the region. The contingent questions allow for positive (increase in willingness to pay and more days for reduction of ranch open space) and negative (decrease in willingness to pay and fewer days for reduction of ranch open space) values, therefore the ordinary least squares regression will be used to evaluate the responses (Greene, 2003; Maddala, 1996).

The objective of this study is to test whether there is a statistical difference in responses from 1993 to 2005. The following ordinary least squares regression was used for these analyses:

$$\text{CV Dollars} = \beta_0 + \beta_1 \text{ Age} + \beta_2 \text{ Income} + \beta_3 \text{ State}$$

The variables used for the analysis were the respondents' value of their vacation experience contingent on if the ranch lands were converted to urban uses (CV Dollars), age of respondent (Age), annual household income (Income) and whether the respondent was a resident of Colorado (State). The respondents' value of their vacation experience was given a positive value if the respondent stated they valued the Steamboat area more and a negative value if the respondent stated they valued the Steamboat area less with the conversion of ranch lands to urban uses. The age variable is the respondents' age in years. The income variable is the respondents' gross annual household income. Further, the 1993 data was adjusted for inflation so it is comparable with the 2005 dollar values. The state resident variable is a dummy variable based on the state the respondent lives and was coded as: 1=Out of state resident and 0=Colorado resident (Figure 1).

Figure 1: Explanation of Variables

Variable	Explanation
Age	Age of the respondent, in years.
CV Dollars	Amount the respondents' vacation experience in the Steamboat area is worth, in 2005 dollars per day, if the existing ranch lands had changed to urban uses. (Positive value if it is worth more per day and negative value if it is worth less per day.)
Income	Gross Annual Household Income, in 2005 dollars
State	Dummy Variable: 0=Colorado state resident; 1=Out of state resident
Year	Dummy Variable: 0=1993 survey responses; 1=2005 survey responses

In general, it is hypothesized that people with higher incomes, who travel greater distances and are older will spend more money in the local economy. We further hypothesize that these people will be willing to pay more to conserve ranchland open space and that these people will be less sensitive to changes in travel costs or travel behavior. Since visitors' expenditures, preferences and quite likely, demographics change over time, it is hypothesized that their travel behavior and willingness to pay for ranch lands will also change over time.

The surveys were administered during 1993 and 2005 in order to capture tourists' behaviors, preferences and travel behavior over time. Since peoples' experiences and preferences change over time, it is hypothesized that their travel behavior and willingness to pay for ranch lands will also change over time. It is inconclusive whether these changes will lead to higher or lower values. Therefore, the general null hypothesis is that the time of survey distribution is independent of the respondent's survey responses associated with their trip to the Steamboat region. The first null hypothesis is that the respondents' decrease (or increase) in willingness to pay contingent on if existing ranch lands were converted to urban uses is independent on when the data was collected, as follows:

$$H_0: \beta_{1993} = \beta_{2005}$$

Similar to the method employed in Loomis *et al.* (2006), separate models, one for each year, within each valuation technique will be created and the coefficient equality within each valuation technique will be statistically tested using the Chow test. The Chow test involves calculating the F-statistic by using the following formula:

$$F = \frac{(RSS_R - RSS_{UR}) / K}{(RSS_{UR}) / (n_1 + n_2 - 2K)}$$

Where:

- RSS_R: Residual Sum of Squares for the Pooled Model
- RSS_{UR}: Sum of the Residual Sum of Squares for the separate models (1993 and 2005)
- K: Number of variables
- n₁: Number of observations for the 1993 sample
- n₂: Number of observations for the 2005 sample

The calculated F-statistic is compared to the critical F-statistic, given degrees of freedom. If the calculated F-statistic is greater than the critical F-statistic, then the null hypothesis will be rejected. In addition, the data sets will be pooled together with a dummy variable representing the year the survey was administered. The statistical significance of the coefficient will be examined by its corresponding t-statistic to determine if there is a statistical difference among the years.

RESULTS

Tourist Demographics

In order to determine what type of tourist visits the Steamboat Springs area, respondents were asked various socio-demographic questions. In addition, they were asked where they

permanently reside to get a better idea of the portion of tourists from out of state that are attracted to the Steamboat Springs area. This section explains the typical tourist that visits Routt County during the summer tourist season.

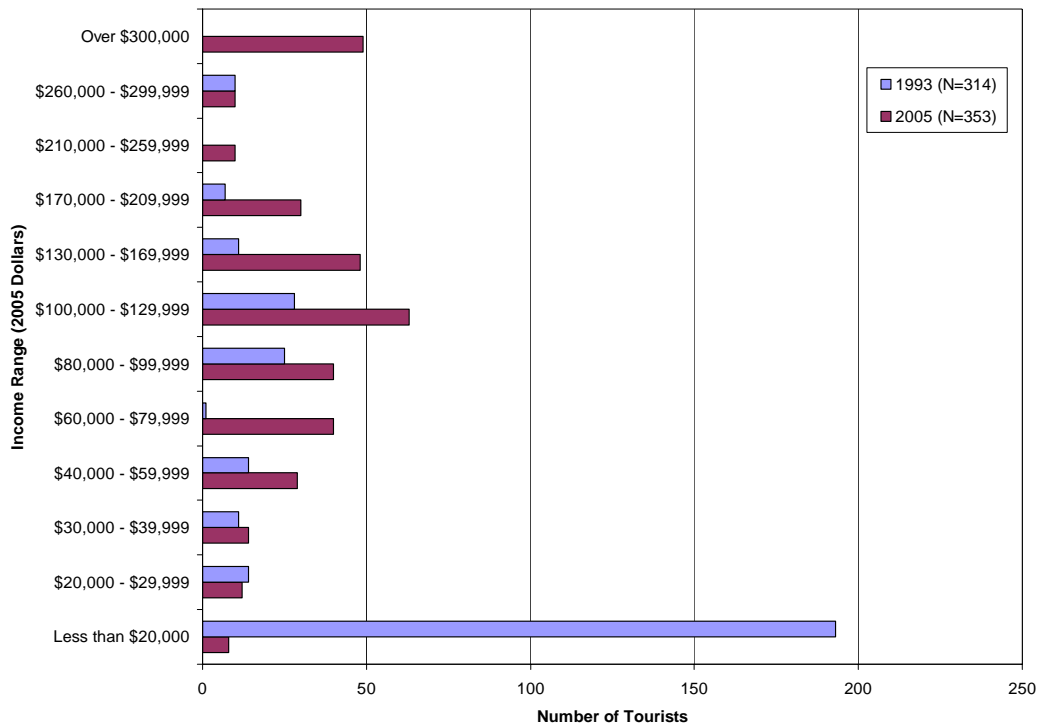
As seen in Figure 2, the only descriptive statistic that significantly differs across the years is the gross annual household income. The mean gross annual household income of the 2005 respondents is more than double than the income of the 1993 respondents, adjusted for inflation.

Figure 2: Descriptive Statistics

MEAN VALUES (In 2005 Dollars)	<i>1993</i>	<i>2005</i>
Age (in Years)	42.7	44.5
% Male	47.8%	53.0%
% Out of State	55.5%	54.2%
Gross Annual Household Income	\$ 50,334	\$ 137,337

Respondents were asked to select their household income before taxes from a range of annual income levels. The responses from the 1993 surveys were adjusted for inflation and re-categorized to fit within the 2005 income ranges. A comparison of the income levels across the years can be viewed in Figure 3.

Figure 3: Routt County Tourists' Gross Household Income (Adjusted to 2005 Dollars)



The Steamboat Springs area has been attracting summer visitors with significantly larger household income levels compared to the visitors from a little over a decade ago. In summary, the typical 2005 summer tourist to Steamboat Springs is a Colorado resident male in his mid-40's with an annual household income of at least \$100,000, while the typical 1993 summer tourist to Steamboat Springs is a Colorado resident male in his early-40's with an annual household income of at least \$50,000.

Tourists' Trip Length, Activities and Expenditures

In order to further understand the typical Steamboat Springs summer tourist, their trip characteristics need to be analyzed. Specifically, the distance they traveled to Routt County, the number of people they traveled with, whether they have ever visited a western ranch and their daily trip expenditures. This section explains the characteristics of a summer trip to Steamboat Springs.

The summer tourist today visiting Steamboat Springs is traveling in larger groups from greater distances and spending about twice the amount in daily expenditures than that of a tourist twelve years ago. In addition, about 44% of the tourists to Steamboat Springs today have ever visited a western ranch, while only 31% of the tourists twelve years ago have ever visited a western ranch (Figure 4).

Figure 4: Trip Characteristics

MEAN VALUES (In 2005 Dollars)	1993	2005
Number in party	3.2	5.8
% Ever Visited a Western Ranch	30.7%	43.9%
Miles one-way from home to visit a substitute site with comparable ROS as Steamboat Springs	563	996
Miles traveled one-way from home to Steamboat Springs	812	857
Daily Expenditure Per Person Per Day (Excluding travel costs)	\$ 88.12	\$ 152.76

Tourists' Contingent Trip Behavior

Although we now know what tourists spent in Routt County, we don't know what they might have spent given the opportunity to increase their local expenditures. That is, we know the minimum value tourists place on a Routt County vacation based on what they did actually spend,

but not the maximum they might have spent had there been a need or the sensitivity of tourist expenditures to changes in conditions in the local tourism experience. This section addresses these issues.

What if valuable features of the Routt County tourism experience change? Will tourists stay more or less time, spend more or less money locally? Respondents were asked how their trip length and trip expenditures might change contingent on if existing ranch lands around Steamboat Springs had changed to urban uses. Figure 5 illustrates the percentage of respondents who would change their expenditures and trip length due to a reduction of ranch open space in Routt County. In the 1993 survey of Routt County visitors, Rosenberger and Loomis (1999) found that 25% of the sample would reduce visitation while 23% of the sample would increase visitation if ranch open space in the Steamboat Springs area were converted to urban and resort uses. The 2005 results show that approximately 50% of the respondents would reduce both their expenditures and number of days spent in the Steamboat Springs area if existing ranch lands were converted to urban uses. The average trip would be reduced by approximately six days with a median value of four days and the average reduction in expenditures would be approximately \$235 per person per trip, having a median value of \$100 per person per trip. Therefore, on average, about \$235 per person per trip would not be spent in the Steamboat Springs area due to existing ranch lands converting to urban uses (Figure 5).

Figure 5: Tourists' Responses if Ranch Lands were Changed to Urban Uses

Would this change your vacation experience in the Steamboat Springs area to be worth more (or fewer) dollars per day during the summer season?			Would this change cause you to visit the Steamboat Springs area more (or fewer) days during the summer season?		
	1993 (N=393)	2005 (N=351)		1993 (N=393)	2005 (N=350)
More	18.1%	0.6%	More	21.6%	0.3%
No Change	58.8%	44.7%	No Change	52.9%	49.1%
Fewer	23.2%	54.7%	Fewer	25.4%	50.6%
Total	100.0%	100.0%	Total	100.0%	100.0%

<i>Per Person Per Trip Values</i>			<i>Days Per Trip Values</i>		
<i>Mean Increase (Reduction)</i>	\$94.66	(\$235.47)	<i>Mean Increase (Reduction)</i>	(0.06)	(5.90)
<i>Median Increase (Reduction)</i>	(\$19.97)	(\$100.00)	<i>Median Increase (Reduction)</i>	(2.00)	(4.00)

In order to test the hypothesis on whether there is a statistical difference among responses given in 1993 and 2005, a Chow test needs to be administered. In order to conduct the Chow test, three models need to be estimated, whose results are displayed in Figure 6.

Figure 6: 1993, 2005 and Pooled Contingent Valuation OLS Models Used for Chow Test

Variable	<i>CV 1993 Model</i>				<i>CV 2005 Model</i>				<i>Pooled Model</i>			
	Coeff.	Std. Error	t-Stat	Prob.	Coeff.	Std. Error	t-Stat	Prob.	Coeff.	Std. Error	t-Stat	Prob.
Constant	159.330	151.969	1.048	0.297	49.205	210.779	0.233	0.816	116.915	134.035	0.872	0.384
Age	-2.498	3.698	0.675	0.501	-4.158	5.175	0.803	0.424	-0.693	3.241	0.214	0.831
Income	0.001	0.001	0.870	0.386	0.855	0.001	0.108	0.914	-0.001	0.001	2.142	0.033
State	117.933	92.893	1.270	0.207	260.326	118.753	2.192	0.031	-48.599	78.930	0.616	0.539
Mean dep. Var.	153.40				-237.74				-31.16			
S.D. of regression	496.96				618.14				589.61			
Residual Sum of Squares	29,268,904				38,926,038				77,961,582			
Residual Std. Dev.	498.04				608.87				586.04			
R-squared	0.02				0.06				0.02			
Adjusted R-squared	0.00				0.03				0.01			
Number of Observations	122				109				231			

Using the calculated F-statistic equation and the model results, the calculated F-statistic is 104.52. With 223 degrees of freedom, the critical F-statistic at the 95% critical level is 3.32. Therefore, the calculated F-statistic (104.52) is greater than the critical F-statistic (3.32) so the null hypothesis is rejected and it is concluded that there is a significant difference in responses between the 1993 and 2005 survey.

To ensure that the difference is significant, an additional statistical test is conducted. A pooled regression model is constructed with a dummy variable representing the year the survey was conducted (Figure 7).

Figure 7: Pooled Ordinary Least Squares Regression with Year Dummy Variable

Variable	Coeff.	Std. Error	t-Stat	Prob.
Constant	-548.334	31.851	-17.216	0.000
Age	0.111	0.057	1.929	0.054
Income	-0.575	0.000	-0.220	0.826
State	-0.224	0.272	-0.822	0.411
Year	-229.863	43.027	-5.342	0.000
Mean dep. Var.	-679.33			
S.D. of regression	552.45			
Residual Sum of Squares	234,992,556			
Residual Std. Dev.	541.60			
R-squared	0.04			
Adjusted R-squared	0.04			
Number of Observations	806			

The coefficient of the year variable has a t-statistic greater than 1.96; therefore it is further shown that there is a statistical difference among responses in 1993 and 2005. Further, the coefficient states that respondents in 2005 value the conversion of ranch lands to urban uses by approximately \$230 less than the 1993 respondents, controlling for the respondents age, income level and state of residence.

In order to extrapolate the per person per trip values to an annual impact value, the total number of summer tourists needs to be estimated. The extrapolation can only be conducted for the 2005 values due to the structural changes in the 1993 tourist season. Based on Steamboat Springs Chamber of Commerce estimates, there are approximately 209,088 tourists who stay in hotels during a summer tourist season (Evans Hall, 2006). To arrive at the number of tourists who camp, we divided the total visitor days at Routt County State Parks by the average length of a trip derived from our sample and found that there are 134,242 total camp visitors (Colorado

State Parks, 2005). We assumed that half of the visitors were Routt County residents, so only 67,121 of the total camp visitors are considered non-resident tourists to Routt County. Therefore, approximately 276,209 tourists visit Routt County during the summer months. Since 50.6% of the survey respondents stated they would reduce their trip to Steamboat if existing ranch lands were converted to urban uses, approximately 139,762 tourists per year can be expected to change their trip behavior based on this land conversion.

To obtain the median estimated loss of summer tourist revenue, we multiply the median value of reduction in spending by the total number of tourists changing their trip behavior. Therefore, the estimated loss of summer tourist revenue due to the development of ranch open space is \$8,735,121 per year. Since approximately 92.7% of tourists' expenditures are spent locally, \$8 million of total loss in tourist revenue would be lost within Routt County's economy per year.

SUMMARY AND CONCLUSION

Over the past twelve years, the Steamboat Springs tourist is a wealthier individual traveling in larger groups, traveling from further distances and spending significantly more in the region. If ranch lands were to be converted to urban uses, half of the respondents stated they would reduce their expenditure level by \$235 per person per trip and reduce their trip length by approximately six days in 2005. Compared to the 1993 summer survey results, support for preserving ranch open space in Routt County has increased from 25% to 50% of tourists stating they would reduce their travel to the Steamboat area if ranch open space were converted to urban uses. The statistical tests prove that there is statistical difference between 1993 and 2005 tourists' travel behavior, attitudes and values associated with converting ranch land to urban

uses. This proves to imply large potential losses to the Steamboat Springs area economy, equating approximately \$8 million, annually.

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