

## Travel Cost Method

TI: Nonparametric and Semi-nonparametric Recreational Demand Analysis

AU: Cooper,-Joseph-C.

SO: American-Journal-of-Agricultural-Economics; 82(2), May 2000, pages 451-62.

AB: This paper addresses issues of specification testing for the travel cost method (TCM). Two nonparametric approaches to TCM analysis are presented. In addition, semi-nonparametric count models for TCM are developed. A numerical illustration is provided in which the three methods are applied to an actual TCM data set on waterfowl hunting and the results are compared to those from a parametric analysis.

TI: The Travel Cost Method: An Empirical Investigation of Randall's Difficulty

AU: Common,-M.; Bull,-T.; Stoeckl,-N.

SO: Australian-Journal-of-Agricultural-and-Resource-Economics; 43(4), December 1999, pages 457-77.

AB: Randall (1994) argued that the Travel Cost Method (TCM) cannot generate monetary measures of recreation site benefits for use in Cost Benefit Analysis. Randall argues that what is relevant to recreational decision-making is the subjective, and unobservable, price of travel, whereas TCM uses the observer-assessed cost of travel. Hence, TCM can at best give ordinally measurable welfare estimates. "Randall's Difficulty" is formulated as an estimation problem and results are derived for that problem. The meaning of, prospects for, and usefulness of ordinal measurement are explored, and the existence of a solution to Randall's Difficulty is considered.

TI: Endogenous On-Site Time in the Recreation Demand Model

AU: Berman,-Matthew-D.; Kim,-Hong-Jin

SO: Land-Economics; 75(4), November 1999, pages 603-19.

AB: Careful modeling of on-site time may substantially improve estimates of the benefits of recreational visits using the travel cost method, especially when on-site time is endogenous. This paper reviews the theory of endogenous on-site time, and shows how the theory may apply to the Random Utility Model (RUM). An empirical example of a two-level, nested-choice model of sport fishing in southcentral Alaska illustrates a discussion of the relative advantages of the different ways to specify endogenous on-site time.)

TI: Mass Tourism and the Demand for Protected Natural Areas: A Travel Cost Approach

AU: Font,-Antoni-Riera

SO: Journal-of-Environmental-Economics-and-Management; 39(1), January 2000, pages 97-116.

AB: This paper presents the argument that when environmental protection projects favor tourist activities, the travel cost method can be used to measure the value tourists give to the recreational services these areas provide. With this idea we describe a model of tourist behavior that allows us to predict whether a tourist will participate in the recreational activities, the frequency of participation according to the areas' attributes, and the costs of producing alternatives. To illustrate the model's application, we consider

tourist demand for and benefits from a set of protected natural areas in Mallorca. (c) 2000 Academic Press

TI: Reconsidering the Hedonic vs. RUM Debate in the Valuation of Recreational Environmental Amenities

AU: Pendleton,-Linwood

SO: Resource-and-Energy-Economics; 21(2), May 1999, pages 167-89.

AB: Two revealed preference methods have emerged as the primary tools for valuing the environmental amenities of recreational resources: the hedonic travel cost method and the random utility method. While both methods are now widely applied, considerable debate still exists over the appropriateness of each method. This paper examines this debate in the literature and shows that much of the contention over the methods results from the improper application of the models or misinterpretations of the theory that underlies the models. Both models are shown to possess strengths and weaknesses that are important determinants of their effectiveness as valuation tools.

TI: Comparing the Economic Value of Mountain Biking Estimated Using Revealed and Stated Preference

AU: Fix,-Peter; Loomis,-John

SO: Journal-of-Environmental-Planning-and-Management; 41(2), March 1998, pages 227-36.

AB: This research compares non-market valuation techniques by applying a count data travel cost method (TCM) and dichotomous choice contingent valuation method (CVM) to a form of recreation for which it has not been previously applied: mountain biking. Due to mountain biking's increasing popularity these estimates of benefits may be useful in addressing conflicts. One of the most famous mountain biking sites in the U.S. (Moab, Utah) was chosen as the site for which to apply these two models. The benefits that were estimated for trips taken in the spring of 1996 are US\$205 and US\$235, for the TCM and CVM, respectively. These values are not statistically different using conventional significant levels.

TI: Measurement Issues in the Travel Cost Method: A Geographical Information Systems Approach

AU: Bateman,-Ian-J. et-al.

SO: Journal-of-Agricultural-Economics; 47(2), May 1996, pages 191-205.

AB: A review of the travel cost (TC) literature shows that the base measurements of travel time and distance underpinning many studies are often obtained via crude simplifications. This paper presents an application of the TC method conducted using geographical information system (GIS) software. This permits superior measurement of both travel time and distance providing a more accurate and realistic basis for valuations.

TI: Economic Valuation of the Chinook Salmon Sport Fishery of the Gulkana River, Alaska, under Current and Alternate Management Plans

AU: Layman,-R.-Craig; Boyce,-John-R.; Criddle,-Keith-R.

SO: Land-Economics; 72(1), February 1996, pages 113-28.

AB: This paper extends the standard travel cost method to develop estimates of the economic value of recreational chinook salmon fishing on the Gulkana River, Alaska, under existing and hypothetical fishery management conditions. Respondents were asked to state how the number of trips that they took to the study area would change if alternative fishery management practices were imposed. Three hypothetical management conditions were considered: a doubled 1992 sport fish harvest, a doubled daily bag limit, and a season bag limit of five. Each of the hypothetical fishery management conditions provides increased economic returns to anglers.

TI: Using the Travel Cost Method to Link Waterfowl Hunting to Agricultural Activities

AU: Cooper,-Joseph-C.

SO: Cahiers-d'Economie-et-Sociologie-Rurales; 0(36), 3rd Trimester 1995, pages 6-26.

AB: This paper demonstrates how the Travel Cost Method (TCM) can be used to examine the relationship between agricultural practices and recreation benefits. The first part of the paper provides some basis theoretical descriptions of TCM and some discussion of the actual procedures necessary to successfully conduct a TCM study. Next, two case studies are presented that demonstrate how to link recreation benefits with agricultural activities. These case studies are: (1) an examination of the effects of contaminated irrigation run-off on waterfowl hunting benefits in a wildlife refuge; and 2) a comparison of the value of water in recreational uses versus agricultural uses in California's San Joaquin Valley. In both case studies, a sensitivity analysis of the TCM demand equation with respect to one of the explanatory variables is done to derive the change in hunting benefits associated with changes in the variable. The zonal TCM model is used in this paper, with TCM demand equations being estimated both with ordinary least squares and with a Poisson count data model.

TI: Individual Travel Cost Method: Estimation and Benefit Assessment with a Discrete and Possibly Grouped Dependent Variable

AU: Dobbs,-Ian-M.

SO: American-Journal-of-Agricultural-Economics; 75(1), February 1993, pages 84-94.

AB: The trip/visit variable in the individual travel cost method is often regarded as discrete. Furthermore, it is often reported in surveys as a grouped variable (the number of visits reported falling into one of several classes). This paper develops a travel cost model that takes account of discreteness and grouping in both demand and benefit estimation. A case study and associated simulations are then reported, which indicate the potential extent of bias that may arise from ignoring discreteness/grouping in demand and benefit estimation. The information loss involved in varying the size of visit classes is also examined.

TI: Combining Contingent Valuation and Travel Cost Data for the Valuation of Nonmarket Goods

AU: Cameron,-Trudy-Ann

SO: Land-Economics; 68(3), August 1992, pages 302-17.

AB: The travel cost method has long been used to infer the economic value of nonmarket resources and public goods. More recently, contingent valuation survey methods have gained popularity for eliciting these values. Here, contingent valuation survey responses

are combined with travel cost method data on actual market behavior to estimate jointly both the parameters of the underlying utility function and its corresponding ordinary demand function. This is a prototypical empirical example of a new modeling strategy, variants of which should prove useful in many applications, especially where reliance on a single valuation method is undesirable.

TI: Critique of Contingent Valuation and Travel Cost Methods for Valuing Natural Resources and Ecosystems

AU: Eberle,-W.-David; Hayden,-F.-Gregory

SO: Journal-of-Economic-Issues; 25(3), September 1991, pages 649-87.

AB: The critique of the contingent valuation method and travel cost method as appraisal methodologies for measuring value of ecosystems concludes neither method can be legitimized in a theoretical or applicable sense. The first section critiques the contingent valuation and travel cost methods in the context of the neoclassical paradigm. The second section applies psychometric standards to evaluate the contingent valuation method. The final section applies the principles of general systems analysis to the contingent valuation method and travel cost method. The utilization of general systems analysis is consistent with the understanding that ecosystems are systems which conform to system principles.

TI: An Individual Travel-Cost Method of Evaluating Forest Recreation

AU: Willis,-K.-G.; Garrod,-G.-D.

SO: Journal-of-Agricultural-Economics; 42(1), January 1991, pages 33-42.

AB: Consumer surplus for outdoor recreation has traditionally been estimated by a Clawson-Knetsch travel-cost method. This paper presents zonal consumer-surplus estimates for visitors to a number of forests and compares these estimates to those derived from individual visitor observations. Both travel-cost procedures are used to assess the magnitude of recreational benefits and are found to produce widely different consumer-surplus estimates. This raises questions about research methodology and has implications for the value of recreation associated with forestry and its contributions to the rate of return on forest investment.

TI: Comparison of Environmental Quality-Induced Demand Shifts Using Time-Series and Cross-Section Data

AU: Loomis,-John; Cooper,-Joseph

SO: Western-Journal-of-Agricultural-Economics; 15(1), July 1990, pages 83-90.

AB: Almost all applications of the Travel-Cost-Method demand function which include site quality variable(s) are multisite models. The results of this study serve as a note of warning that using the demand equation derived from multisite cross-sectional data to perform a benefit-cost analysis of changes in quality at a single site may not accurately predict the resulting change in the number of trips to that site. In this situation, estimates of the benefits of quality improvements may be unreliable.

TI: Valuing Rural Recreation Benefits: An Empirical Comparison of Two Approaches

AU: Hanley,-N.-D.

SO: Journal-of-Agricultural-Economics; 40(3), September 1989, pages 361-74.

AB: Two methodologies for valuing non-market benefits (contingent valuation and the travel cost method) are briefly described. Both are then applied to the problem of valuing non-market recreation benefits derived by visitors to a part of the Queen Elizabeth Forest Park in Central Scotland. Results, in terms of consumer surplus estimates, are presented for each method, and problem areas found in applying the two methodologies are pointed out.

TI: The Importance of Sample Discrimination in Using the Travel Cost Method to Estimate the Benefits of Improved Water Quality

AU: Ribaud, -Marc-O.; Epp, -Donald-J.

SO: Land-Economics; 60(4), November 1984, pages 397-403.

TI: Estimating the Value of Variations in Anglers' Success Rates: An Application of the Multiple-Site Travel Cost Method

AU: Samples, -Karl-C.; Bishop, -Richard-C.

SO: Marine-Resource-Economics; 2(1), 1985, pages 55-74.

TI: The Hedonic Travel Cost Method

AU: Brown, -Gardner-M., Jr.; Mendelsohn, -Robert

SO: Review-of-Economics-and-Statistics; 66(3), August 1984, pages 427-33.

TI: Alternative Ways to Measure Recreation Values by the Travel Cost Method

AU: Menz, -Fredric-C.; Wilton, -Donald-P.

SO: American-Journal-of-Agricultural-Economics; 65(2), May 1983, pages 332-36.

TI: Income and Substitution Effects in the Travel Cost Model: An Application to Indiana State Parks

AU: Emmert, -Jeremy-J.

SO: American-Journal-of-Agricultural-Economics; 81(5), 1999, pages 1330-37.

TI: The Value of Ranch Open Space to Tourists: Combining Observed and Contingent Behavior Data

AU: Rosenberger, -Randall-S.; Loomis, -John-B.

SO: Growth-and-Change; 30(3), Summer 1999, pages 366-83.

AB: Several empirical studies have estimated the value of agricultural land as open space to local residents. An important group of individuals that may be affected by the loss of agricultural land are visitors to a region. The value of ranchland to tourists visiting a resort town in the Rocky Mountains is estimated through a travel cost model that combines information on observed behavior data from actual trips with contingent behavior data on intended current visitation if the resource were converted to urban and resort uses. The value of ranch open space to tourists is the gain or loss in consumer surplus derived from a visit to the study area attributable to the resource. A random effects Poisson regression model is estimated because of the panel nature of the data, accounting for the correlation of the multiple responses from heterogeneous individuals. Twenty-five percent of the sample would reduce visitation and 23 percent of the sample

would increase visitation if ranch open space were converted to urban and resort uses. The overall effect of converting ranch open space to resort and urban uses is no net change in average consumer surplus per trip for summer tourists in general.

TI: Estimating the Economic Impact of Climate Change on the Freshwater Sportsfisheries of the Northeastern U.S.

AU: Pendleton,-Linwood-H.; Mendelsohn,-Robert

SO: Land-Economics; 74(4), November 1998, pages 483-96.

AB: This study links models of global climate circulation, ecology, and economic valuation (hedonic travel cost and random utility models) to value the impact of global warming on freshwater sportfishing in the northeastern United States. An origin-specific linear random utility model (RUM) is introduced. The results of the RUM are shown to be comparable to those of a hedonic travel cost model. A doubling of atmospheric carbon dioxide is predicted to generate between a \$4.6 million loss and a \$20.5 million net benefit for the Northeast, depending on the climate scenario.

TI: Using Partial Site Aggregation to Reduce Bias in Random Utility Travel Cost Models

AU: Lupi,-Frank; Feather,-Peter-M.

SO: Water-Resources-Research; 34(12), December 1998, pages 3595-3603.

TI: Evaluation of Tourism and Tourist Resources in China: Existing Methods and Their Limitations

AU: Wen,-Jie

SO: International-Journal-of-Social-Economics; 25(2-3-4), 1998, pages 467-85.

AB: The evaluation of both tourism and tourist resources in China remains problematic on the macro-level, only the positive contributions of tourism have been evaluated, ignoring the aspects of disparities between the east coast and the inland area, inbound tourism and domestic tourism, nature-based and city-based tourism, positive and negative effects from tourism and so on. On the micro-and site-specific level, tourist resources characterised by non-marketable and non-use values are not properly evaluated, exposing these fragile resources to the plight of exploitation. Commercialisation of tourist resources, including natural environment and ethnic cultures, threatens further development of tourism in China. The limited applicability of the travel cost and the contingent valuation method in measuring the value of recreation sites in China is discussed.

TI: 'A Travel Cost Analysis of the Value of Carnarvon Gorge National Park for Recreational Use': Comment

AU: Kennedy,-John

SO: Australian-Journal-of-Agricultural-and-Resource-Economics; 42(3), September 1998, pages 263-65.

TI: 'A Travel Cost Analysis of the Value of Carnarvon Gorge National Park for Recreational Use': Reprise

AU: Beal,-Diana

SO: Australian-Journal-of-Agricultural-and-Resource-Economics; 42(3), September 1998, pages 267-68.

TI: The Gains from Combining Travel Cost and Contingent Valuation Data to Value Nonmarket Goods

AU: Kling,-Catherine-L.

SO: Land-Economics; 73(3), August 1997, pages 428-39.

AB: This paper provides a critical assessment of the improvements in precision and bias to welfare measures from combining contingent valuation and travel cost data. Simulation experiments are performed using a variation of the model first suggested by T. Cameron (1992) with a focus on identifying likely lower bounds on these gains. In addition to examining single-bounded contingent valuation as a component of the combined model, this paper investigates additional gains that may accrue from employing a double-bounded variant of contingent valuation. Sizable gains in both bias and precision are found in the simulation experiments. The results suggest that additional investigation into these models is warranted.

TI: La valeur d'usage a des fins de loisir des espaces proteges en Espagne. Comparaison entre methode des couts de deplacement et methode d'evaluation contingente.

(Recreational Use Value of Protected Areas in Spain. A Comparison of the Travel Cost and Contingent Valuation Method. With English summary.)

AU: Perez-y-PJerez,-Luis et-al.

SO: Cahiers-d'Economie-et-Sociologie-Rurales; 0(41), 4th Trimester 1996, pages 39-56.

AB: Valuation of environmental goods, such as protected natural areas, allows us to obtain information that could be included in cost-benefit analysis as an aid for public sector decision-taking processes. This article presents an application of the contingent valuation method and of the travel cost method. We remark that the results are close to those obtained in other applications found in environmental goods valuation literature and detect certain sensibility of the results we obtain depending on the hypothesis considered.

TI: El valor de los espacios de interes natural en Espana. Aplicacion de los metodos de la valoracion contingente y el coste del desplazamiento. (The Value of Spaces of Natural Interest in Spain. An Application of the Contingent Valuation and Travel Cost Methods. With English summary.)

AU: Riera,-Pere; Descalzi,-Carles; Ruiz,-Alex

SO: Revista-Espanola-de-Economia; 0(0), Special Issue 1994, pages 207-29.

AB: In the past, the Travel Cost Model (TCM) has been the most frequently used method to value recreational goods in the absence of market. However, among all the methods available to value environmental externalities, the Contingent Valuation Method (CVM) has been the most popular among economists over the last few years. Both in the U.S. and Europe the number of CVM applications and theoretical papers is increasing sharply. This trend is starting to be found in Spain too. This article presents an application of TCM and CVM to value an area of natural interest in the Catalan Pirynees and offers a comparison of the results from both methods. Theoretically, one could expect to find CV values to be larger than TC values, since the former also accounts for

option values. However, the results of the Spanish application show otherwise. Other recent studies suggest the same controversial results. The paper also deals with some other aspects present in the international debate on the use of valuation methods for non-market goods.

TI: Combining Contingent Valuation and Travel Cost Data for the Valuation of Nonmarket Goods

AU: Cameron,-Trudy-Ann

SO: Land-Economics; 68(3), August 1992, pages 302-17.

AB: The travel cost method has long been used to infer the economic value of nonmarket resources and public goods. More recently, contingent valuation survey methods have gained popularity for eliciting these values. Here, contingent valuation survey responses are combined with travel cost method data on actual market behavior to estimate jointly both the parameters of the underlying utility function and its corresponding ordinary demand function. This is a prototypical empirical example of a new modeling strategy, variants of which should prove useful in many applications, especially where reliance on a single valuation method is undesirable.

TI: Valuation of Environmental Amenities

AU: Adamowicz,-W.-L.

SO: Canadian-Journal-of-Agricultural-Economics; 39(4), Part 1, December 1991, pages 609-18.

AB: Environmental goods and services which are not priced in traditional economic markets are typically excluded from decision making approaches which are based on monetary values. Over the past 30 years economists have attempted to derive approaches to incorporate monetary values of environmental amenities into decision-making frameworks. This paper reviews the approaches currently in use to estimate values for environmental goods and services. Direct (contingent valuation) and indirect (travel cost) approaches are examined. The successes and failures are outlined. The conclusions suggest that there are classes of environmental amenities that can be assessed using these monetary tools and there are other classes for which the current techniques are questionable.

TI: Comparing Benefit Estimates from Travel Cost and Contingent Valuation Using Confidence Intervals for Hicksian Welfare Measures

AU: Loomis,-John; Creel,-Michael; Park,-Timothy-A.

SO: Applied-Economics; 23(11), November 1991, pages 1725-31.

TI: Can We Measure the Economic Value of Environmental Amenities?

AU: Smith,-V.-Kerry

SO: Southern-Economic-Journal; 56(4), April 1990, pages 856-78.

AB: This paper reviews the conceptual basis for valuing environmental amenities and discusses travel cost recreation demand and hedonic property value models as strategies that rely on observed choice to measure use values for environmental resources. The

growing importance of measuring nonuse values is noted because people experience satisfaction from environmental resources without actually using them. Nonuse values do not require a choice, so measuring them requires analyzing other behavioral indicators: conversation and the adaptations people make as they learn. Recent advances are described in using surveys as conversational sources of information about people's values within a contingent valuation framework.

TI: Valuing Rural Recreation Benefits: An Empirical Comparison of Two Approaches  
AU: Hanley,-N.-D.

SO: Journal-of-Agricultural-Economics; 40(3), September 1989, pages 361-74.

AB: Two methodologies for valuing non-market benefits (contingent valuation and the travel cost method) are briefly described. Both are then applied to the problem of valuing non-market recreation benefits derived by visitors to a part of the Queen Elizabeth Forest Park in Central Scotland. Results, in terms of consumer surplus estimates, are presented for each method, and problem areas found in applying the two methodologies are pointed out.

TI: Valuing Non-market Recreation Goods: An Evaluative Survey of the Literature on the Travel Cost and Contingent Valuation Methods

AU: Durden,-Garey; Shogren,-Jason-F.

SO: Review-of-Regional-Studies; 18(3), Fall 1988, pages 1-15.

TI: Combining Farrell Frontier and Hedonic Travel Cost Models for Valuing Estuarine Quality

AU: Smith,-V.-Kerry; Palmquist,-Raymond-B.; Jakus,-Paul

SO: Review-of-Economics-and-Statistics; 73(4), November 1991, pages 694-99.

AB: This paper extends the Brown-Mendelsohn hedonic travel cost model by estimating the travel cost function for each recreationist as a technically efficient frontier. It also constrains the marginal prices for desirable characteristics to be nonnegative. The model is used to value improvements in the quality of sport fishing in the Albemarle-Pamlico Estuary in North Carolina. The application compares the performance of the frontier hedonic travel cost with ordinary least squares estimates, and finds the former to be free of problems identified in the literature and to provide more plausible and robust benefit estimates for quality improvements.

TI: The Economic Benefits of Surface Water Quality Improvements in Developing Countries: A Case Study of Davao, Philippines

AU: Choe,-KyeongAe; Whittington,-Dale; Lauria,-Donald-T.

SO: Land-Economics; 72(4), November 1996, pages 519-37.

AB: Two nonmarket valuation techniques--the contingent valuation method and travel cost model--are used to estimate the economic value that people in Davao, Philippines, place on improving the water quality of the rivers and sea near their community. The contingent valuation and travel cost estimates are very close to each other and are quite

low, both in absolute terms and as a percentage of household income. These findings suggest that water pollution control is simply not a high priority for Davao's residents, and support the argument that households' willingness to pay for environmental amenities, such as improved water quality, is low.