Random Utility/Multinomial Logit Model Literature

Amemiya, Takeshi. 1977. "On a Two-Step Estimation of a Multivariate Logit Model." <u>Journal of Econometrics</u>, Volume: 8, Issue: 1978, Pages: 13-21. **Keywords**: two-step estimate, logit models, asymptotically variance.

Bockstael,-Nancy-E.; McConnell,-K.-E.; Strand,-I.-E. "Random Utility Model for Sportfishing: Some Preliminary Results for Florida." <u>Marine-Resource-Economics</u>; 6(3), 1989, pages 245-60.

The gray literature in the field of nonmarket benefit measurement has made extensive use of the random utility (or discrete choice) model in recent years, but few applications appear in the literature. This article provides such an application, illustrating the technique with preliminary results from a regional study modeling east cost sportfishing behavior. The article discusses some of the strengths and weaknesses of the random utility model. It also illustrates how data regularly collected by the National Marine Fisheries Service can be supplemented with economic survey data to estimate these discrete choice behavioral models.

Bockstael,-Nancy-E.; Hanemann,-W.-Michael; Kling,-Catherine-L. "Estimating the Value of Water Quality Improvements in a Recreational Demand Framework." <u>Water-Resources-Research</u>; 23(5), May 1987, pages 951-60.

Cameron,-Trudy-Ann; Englin,-Jeffrey. "Welfare Effects of Changes in Environmental Quality under Individual Uncertainty about Use." RAND-Journal-of-Economics; 28(0), Special Issue 1997, pages S45-70.

The authors adapt the theoretical state-preference model to value nonmarket public goods under individual uncertainty about use, illustrating with an assessment of willingness-to-pay to prevent acid rain lake damage in the northeast United States. Individual usage uncertainty is modeled via probabilities of participation in trout fishing. Changes in environmental quality are valued using a random utility model to explain yes/no responses to a contingent valuation question. The authors produce quantitative welfare measures: individual fitted and simulated passive- and active-use values, individual expected consumer surplus, option price, option value, and complete individual willingness-to-pay loci.

Clark,-Stephen-A. "The Random Utility Model with an Infinite Choice Space." <u>Economic-Theory</u>; 7(1), January 1996, pages 179-89.

This essay presents a measure-theoretic version of the random utility model with no substantive restrictions upon the choice space. The analysis is based upon DeFinetti's Coherency Axiom, which characterizes a set function as a finitely additive probability measure. The central result is the equivalence of the random utility maximization hypothesis and the coherency of the choice probabilities over all allowable constraint sets.

Cropper, Maureen L.; Leland Deck; Nalin Kishor; Kenneth McConnell. 1993. "Valuing Product

Attributes Using Single Market Data: A Comparison of Hedonic and Discrete Choice Approaches." <u>The Review of Economics and Statistics</u>, Volume: 75, Issue: 2, Pages: 225-232. **Keywords**: multinomial logit model, hedonic model, welfare evaluation.

The paper compares estimates of welfare measures derived from a hedonic price model with those from the random utility model for given known household preferences. After simulating an equilibrium in an Baltimore housing market, the paper uses the resulting hedonic price and individual choice data to estimate both a hedonic price model with its marginal bid functions and a random utility model. The random utiltiy model provided more accurate estimates of the known welfare measure than the hedonic price model for non-marginal changes in housing attributes.

Feather,-Peter-M. "Sampling and Aggregation Issues in Random Utility Model Estimation." <u>American-Journal-of-Agricultural-Economics;</u> 76(4), November 1994, pages 772-80.

Measurement of nonmarket values often involves subjective judgments. Since these judgments may influence results, they should be carefully considered. The author focuses on an aspect of subjective choice relating to the estimation of random utility models. Such models require specification of each recreationalist's choice set. Whether an individual perceives his choice set as composed of all possible alternatives, a few popular alternatives, or collections of spatially aggregated alternatives is an important judgment affecting the conclusions.

Greene, Gretchen, Charles B. Moss, and Thomas H. Spreen (1997). "The Demand for Recreational Fishing in Tampa Bay, Florida: A Random Utility Approach." <u>Marine Resource Economics</u>, forthcoming, May.

An estimation of demand for recreational fishing in Tampa Bay, Florida, can facilitate the environmental management of the bay. A nested random utility travel cost model is used to estimate access values. Results suggest average annual values for the bay alone are $18.14 and $0.048 for participants and nonparticipants, respectively.

Hanemann, W. Michael (1984). "Discrete/Continuous Models of Consumer Demand." <u>Econometrica</u>, 52(3):541-561.

This paper develops a unified framework for formulating econometric models of discrete/continuous consumer choices in which the discrete and continuous choices both flow from the same underlying (random)utility maximization decision. As a special case a number of models suitable for empirical application are developed where the discrete choice is among different f=brands of a commodity. Since these brands are essentially substitutes, the consumer prefers to buy only one brand at any time; the discrete choice is which brand to select and the continuous choice is how many units to buy.

Hausman, J.A. and David A. Wise. 1978. **"**A Conditional Probit Model for Qualitative Choice: Discrete Decisions Recognizing Interdependence and Heterogeneous Preferences." **Econometrica.** 46:403-426.

Hausman, Jerry A. and Daniel McFadden (1984). "Specification Tests for the Multinomial Logit Model." Econometrica, 52(5):1219-1240.

Discrete choice models are now used in a variety of situations in applied econometrics. By far the model specification that is used most often is the multinomial logit model. Yet it is widely known that a potentially important drawback of the multinomial logit model is the independence from irrelevant alternatives property. While most analysts recognize the implications of the independence of irrelevant alternatives property, it has remained basically a maintained assumption in applications.

In this paper we provide two sets of computationally convenient specification tests for the multinomial logit model. The first test is an application of the Hausman (1978) specification test procedure. The basic idea for the test here is to test the reverse implication of the independence from irrelevant alternatives property. The test statistic is easy to compute sine it only requires computation of a quadratic form that involves the difference of the parameter estimates and the differences of the estimated covariance matrices.

The second set of specification tests that we propose is based on more classical test procedures. We consider a generalization of the multinomial logit model that is called the nested logit model. Since the multinomial logit model is a special case of the more general model when a given parameter equals one, classical test procedures such as the Wald, likelihood ratio, and Lagrange multiplier tests can be used.

The two sets of specification test procedures are then compared for an example where exact and approximate comparisons are possible.

Horowitz, Joel L. ; Denis Bolduc; Suresh Divakar; John Geweke; Fusun Gonul; Vassilis Hajivassiliou; Frank Koppelman; Michael Keane; Rosa Matzkin; Peter Rossi; Paul Ruud. 1994. "Advances in Random Utility Models." Marketing Letters. **Keywords**: Conjoint, Stated Choice.

Special Issue On Workshop Reports From the Duke Invitation Conference on Consumer Decision Making and Choice Behavior.

Kaoru, Y. 1988. "A Discrete Choice Benefit Analysis of Marine Recreational Fishing: Does Site Definition Matter?" Unpublished mimeo. Marine Policy Center, Woods Hole, MA. 35 pp.

Kaoru,-Yoshiaki; Smith,-V.-Kerry; Liu,-Jin-Long. "Using Random Utility Models to Estimate the Recreational Value of Estuarine Resources." American-Journal-of-Agricultural-Economics; 77(1), February 1995, pages 141-51.

In this paper, the authors describe a model using a household production framework to link measures of nonpoint source pollution to fishing quality and a random utility model to describe how that quality influences sport fishing parties' decisions in North Carolina. The results provide clear support for using a model that evaluates the effects of pollution on the activities and decisions associated with the fishing activity once a trip is taken. Site selection decisions are then conditioned on the anticipated quality of fishing sites. The framework also has the advantage of

linking the spatial, technical, and economic information required to evaluate the management plans required for estuaries under the National Estuarine Program.

Kaoru,-Yoshiaki. "Measuring Marine Recreation Benefits of Water Quality Improvements by the Nested Random Utility Model." Resource-and-Energy-Economics; 17(2), August 1995, pages 119-36.

This paper discusses and evaluates three issues to which the analyst has not paid much attention when describing recreational site choices and implementing the nested random utility model (RUM) for recreation benefit measurement: (1) the effects of party composition on recreational decisions; (2) the implications of estimating a nested RUM on the functional structure of the underlying indirect utility function; and (3) the variation in benefit estimates across quality improvement scenarios. A three-level nested RUM is estimated and the benefits of water quality improvements are measured for marine recreational fishing in the Albemarle-Pamlico Estuary of North Carolina.

Kaoru,-Yoshiaki; Smith,-V.-Kerry; Liu,-Jin-Long. "Using Random Utility Models to Estimate the Recreational Value of Estuarine Resources." Resources for the Future Discussion Paper: 94-04, December 1993, pages 29.

This paper describes an integrated model using a household production framework to link measures of nonpoint source pollution to fishing quality and a random utility model to describe how that quality influences the decisions of sport fishing parties in the Albemarle-Pamlico estuarine system in North Carolina. The results provide clear support for using a model that evaluates the effects of pollution on the activities and decisions associated with the fishing activity once a trip is taken. Site selection decisions are then conditioned on the anticipated quality of fishing trips at each site. The framework also has the advantage of linking the spatial, technical, and economic information required to evaluate the management plans required for estuaries under the National Estuarine Program.

Kaoru, Yoshiaki ; V. Kerry Smith. 1990. ""Black Mayonnaise" and Marine Recreation: Methodological Issues in Valuing a Cleanup." Resources for the Future, Octoberr 1990.
    Keywords: random utility model, marine recreation, benefits of pollution control.

Kling,-Catherine-L. "The Reliability of Estimates of Environmental Benefits from Recreation Demand Models." American-Journal-of-Agricultural-Economics; 70(4), November 1988, pages 892-901.

Recreation demand models are commonly-employ ed tools of economists interested in valuing improvements in environmental amenities. Despite their importance, little comparative work has been undertaken to examine the ability of the models to accurately estimate welfare changes. A simulation study designed to compare the reliability of estimated welfare measures (compensating variation and consumer surplus) from several commonly-employed recreation demand models is presented. Results of the study indicate that choice of functional form and model specification are important determinants of the result ing estimates of benefits.

Kling, Catherine L. and Joseph A. Herriges (1995). "An Empirical Investigation of the Consistency of Nested Logit Models with Utility Maximization." <u>American Journal of Agricultural Economics</u>, 77(4):875-884.

Global conditions under which nested logit models are consistent with utility maximization are provided by Daly and Zachary and by McFadden. Recently, Borsch-Supan and Herriges and Kling have provided conditions under which a nested logit model is locally consistent. However, previous work has not discussed implementation of these conditions. Here, three alternative approachers to checking and formally testing for the consistency conditions using classical statistics are investigated. In addition, a Bayesian approach to interpreting and imposing the local consistency conditions is provided. The application is based on anglers' choices regarding sportfishing alternatives in southern California.

Lin,-Pei-Chien; Adams,-Richard-M.; Berrens,-Robert-P. "Welfare Effects of Fishery Policies: Native American Treaty Rights and Recreational Salmon Fishing." <u>Journal-of-Agricultural-and-Resource-Economics</u>; 21(2), December 1996, pages 263-76.

Severe declines in Pacific Northwest salmon stocks, coupled with increasing recreational demands, and judicial decisions supporting Native American fishing rights create challenges for fishery agencies. This article explores the welfare effects on recreational anglers of alternative salmon allocation policies to meet Native American treaty rights. A discrete choice random utility model, coupled with a poisson trip frequency model, is used to analyze these welfare effects. The model is fit to survey data from the Willamette River spring chinook fishery, an important recreational fishery in Oregon. Management options have dramatically different welfare effects.

McConnell,-K.-E. "Consumer Surplus from Discrete Choice Models." <u>Journal-of-Environmental-Economics-and-Management</u>; 29(3), Part 1 Nov. 1995, pages 263-70.

The budget-constrained random utility model (RUM) gives utility-consistent measures of welfare, but requires the length of the planning period be specified. An alternative is to treat the RUM probabilities as behavioral and calculate consumer surplus. This paper shows that such calculations lead to the same welfare measures as RUM calculations. The paper provides support and an alternative justification for the standard welfare measured. (c) 1995 Academic Press, Inc.

McConnell,-Kenneth-E.; Strand,-Ivar-E.; Blake-Hedges,-Lynne. "Random Utility Models of Recreational Fishing: Catching Fish Using a Poisson Process." <u>Marine-Resource-Economics;</u> 10(3), Fall 1995, pages 247-61.

This paper presents a Poisson model of expected angler catch during a sportfishing trip and employs the expected catch in a random utility model of site choice. The approach permits greater heterogeneity in expected catch and in individual welfare estimates from policies such as creel limits.

McFadden, D. 1978. "**Modelling the Choice of Residential Location**." **Spatial Interaction**

Theory and Planning Models. ed. A. Karlquist, L. Lundquist, F. Snickars and J.L. Weibull. Amsterdam: North Holland.

McFadden, Daniel (1974). "Conditional Logit Analysis of Qualitative Choice Behavior." In Zarembka, Paul (ed.) (1974). <u>Frontiers in Econometrics</u>. Academic Press, New York.

This paper outlines a general procedure for formulating econometric models of population choice behavior from distributions of individual decision rules. A concrete case with useful empirical properties, conditional logit analysis, is developed in detail. The relevance of these methods to economic analysis can be indicated by a list of the consumer choice problems to which conditional logit analysis has been applied: choice of college attended, choice of occupation, labor force participation, choice of geographical location and migration, choice of number of children, housing choice, choice of number and brand of automobiles owned, choice of shopping travel model and destination.

McFadden, Daniel (1987). "Regression-Based Specification Tests for the Multinomial Logit Model." <u>Journal of Econometrics</u>, 34:63-82.

Diagnostic tests for omitted variables or functional misspecification in the multinomial logit (MNL) model can be performed conveniently by testing the significance of auxiliary regressions of residuals on included and excluded variables. In particular, Lagrange Multiplier (LM) and Hausman-McFadden (HM) tests of the Independence from Irrelevant Alternatives (IIA) Property on the MNL model can be carried out by the regression method using suitably defined excluded variables. Using this method, it is straightforward to test jointly against several sources of misspecification and to diagnose the structure of deviations from the MNL model.

Milon,-J.-Walter. "A Nested Demand Shares Model of Artificial Marine Habitat Choice by Sport Anglers." <u>Marine-Resource-Economics;</u> 5(3), 1988, pages 191-213.

There is a growing public interest in the development of artificial habitats to enhance and diversify coastal marine resources for recreational and commercial uses. In this article, a hierarchical discrete choice model of recreational demand for artificial habitat is presented using a nested multinomial logit analysis of artificial and natural habitat site choice by sport anglers. The model can be used to evaluate the effects of site characteristics and socioeconomic attributes of individual sport benefits of new artificial habitat. An empirical application using survey data from sport anglers in southeast Florida is reported. The model parameters are used to estimate the expected use benefits and distributional implications of alternative new artificial habitat sites. Extensions and limitations of the model for artificial habitat planning are considered.

Morey, Edward R.; Donald Waldman; Djeto Assane; Douglas Shaw. 1995. "Searching for a Model of Multiple-Site Recreation Demand that Admits Interior and Boundary Solutions." <u>American Journal of Agricultural Economics</u>, Volume: 77, Issue: 1, Pages: 129-140. **Keywords**: travel cost, repeated nested-logit model, multinomial share model, Kuhn-Tucker model.

This paper critiques eight recreation demand models in terms of their ability to accommodate boundary solutions. Three models are recommended for consideration when there are multiple sites and the data set includes a significant number of boundary solutions: a repeated nested-logit model, a multinomial share model, and a Kuhn-Tucker model.

Morey,-Edward-R.; Shaw,-W.-Douglass; Rowe,-Robert-D. "A Discrete-Choice Model of Recreational Participation, Site Choice, and Activity Valuation When Complete Trip Data Are Not Available." Journal-of-Environmental-Economics-and-Management; 20(2), March 1991, pages 181-201.

A discrete-choice model of the demand for site-specific recreational activities is developed and estimated. It simultaneously predicts both how many trips the individual will take and which site will be chosen on each trip. The model is formulated to estimate demand when the data set reports the total number of trips in a given time period, but the actual destinations for only a subset of the total. The model also includes a correction for sample-selectivity bias. The application is marine recreational fishing. The consumer's surplus associated with any change in supply conditions is derived and used to assess the impact of chantes in species availability.

Morey, E.R., R.D. Rowe and D. Shaw. l987. "The Logit Model and Expected Consumer's Surplus Measures: Valuing Marine Recreational Fishing." Unpublished mimeo. Department of Economics, University of Colorado Boulder, CO. 31 pp.

Morey, Edward R.; Robert D. Rowe; Michael Watson. 1993. "A Repeated Nested-Logit Model of Atlantic Salmon Fishing." American Journal of Agricultural Economics, Volume: 75, Issue: 3, Pages: 579-592. **Keywords**: Atlantic salmon fishing, nested-logit, travel cost model.

Participation and site choice for Atlantic salmon fishing are modeled in the context of a repeated three-level nested-logit model. For comparison, six other travel-cost models are estimated. These include restrictive cases of the nested-logit model, a partial demand model, and two single-site demand models.

Morey, Edward R. 1994. "Two RUMs Uncloaked: Nested-Logit Models of Site Choice and Nested-Logit Models of Participation and Site Choice." March 24, 1994, Monograph. **Keywords**: Travel Cost Method

This paper lays out the theory behind the nested-logit model of site choice and the nested-logit model of participation and site choice; and then provides derivations of the properties of nested-logit models. Examples are used to tie the theory to recreation demand and benefit estimation.

Needelman, Michael S.; Mary Jo Kealy. 1995. "Recreational Swimming Benefits of New Hampshire Lake Water Quality Policies: An Application of a Repeated Discrete Choice Model." Agricultural and Resource Economics Review, April 1995, pages: 78-87.

Parsons,-George-R.; Hauber,-A.-Brett. "Choice Set Boundaries in a Random Utility Model of Recreation Demand." University of Delaware, Department of Economics, Working Paper 96/3, March 1996, pages 11.

Random Utility Models are commonly used the recreation demand literature to model the choice among a set of qualitatively different recreation sites. Often, due to computational or data constraints, analysts do not include all possible alternatives in the choice set. This research is concerned with choice set boundaries. In particular, we ask, "how far away from a person's home must a site be before it is no longer considered part of the choice set in estimation?" We examine this question by estimating a single model with varying choice set boundaries using a data set of recreational fishing activity in Maine. In this analysis, we show that there exists some threshold distance beyond which adding additional sites to the choice set has negligible effects on the estimation results.

Parsons,-George-R.; Needelman,-Michael-S. "Site Aggregation in a Random Utility Model of Recreation." Land-Economics; 68(4), November 1992, pages 418-33.

Random utility models are commonly used to model the choice among a set of alternatives. Often, due to data or computational constraints, the analyst must use aggregated alternatives to estimate the model. These aggregates are defined by averaging characteristics of alternatives over prespecified groups. In this analysis, the authors demonstrate that unless some very restrictive conditions hold, the use of aggregated alternatives will lead to biased results. Then, using a data set of recreational fishing in Wisconsin, they show the effects that this bias can have on the results estimated from the model.

Parsons,-George-R.; Kealy,-Mary-Jo. "Randomly Drawn Opportunity Sets in a Random Utility Model of Lake Recreation." Land-Economics; 68(1), February 1992, pages 93-106.

Random utility models are widely applied in studies of recreation demand. The model is particularly useful when the number of recreation sites from which individuals may choose is large. Yet, when the number gets too large, say in the hundreds, estimation becomes burdensome. The authors present an analysis suggested by Daniel McFadden (1978) for dealing with large numbers of sites. They estimate a model using randomly drawn opportunity sets. The authors use each person's chosen site plus a random draw of as few as eleven other sites (when hundreds are available) to estimate a plausible behavioral model.

Parsons,-George-R.; Kealy,-Mary-Jo. "A Demand Theory for Number of Trips in a Random Utility Model of Recreation." Journal-of-Environmental-Economics-and-Management; 29(3), Part 1 Nov. 1995, pages 357-67.

We present a random utility model of recreation site choice that incorporates an aggregate demand function for number of trips during a season. We derive the trip demand function using conventional demand theory and use it to calculate seasonal welfare changes due to improvements in site characteristics or addition of new sites. The model is based on Bockstael, et al.'s participation function. (c) 1995 Academic Press, Inc.

Parsons,-George-R.; Kealy,-Mary-Jo. "A Demand Theory for Number of Trips in A Random Utility Model of Recreation." University of Delaware Department of Economics Working Paper 94-1, January 1994, pages 13.

We present a simple Random Utility Model of recreation site choice that incorporates an aggregate demand function for number of trips during a season. We derive the trip demand function using conventional demand theory and use it to calculate seasonal welfare changes due to improvements in site characteristics or addition of new sites. The model is based on Bockstael, Hanemann, and Kling's participation function.

Parsons,-George-R.; Kealy,-Mary-Jo. "Benefits Transfer in a Random Utility Model of Recreation." Water-Resources-Research; 30(8), August 1994, pages 2477-84.

Parsons,-George-R.; Kealy,-Mary-Jo. "Benefits Transfer in a Random Utility Model of Recreation." University of Delaware Department of Economics Working Paper 93-17, December 1993, pages 16.

Time and other resource constraints often call for benefit-cost analyses of environmental policies that rely on models from existing studies. When such analyses are done the benefit or cost assessment is said to be "transferred" from an existing study to a policy site. Little economic analysis has been done to judge the viability of such transfers. This is unfortunate given their widespread use. In this paper we present results of an experiment designed to help judge the viability of transferring a Random Utility-Model (RUM) of recreation. Our experiment follows the design of Atherton and Ben-Akiva(1976). We analyze a RUM of lake recreation in the state of Wisconsin. The model is based on the survey results of 603 individuals who visited lakes in the state. We divide the data set into two groups: (1) respondents living in Milwaukee County and (2) respondents not living in Milwaukee County. Then we transfer a model estimated with the non-Milwaukee sample to the Milwaukee sample. Our (hypothetical) purpose throughout is to estimate the benefits of improving water quality for the 117 Milwaukee residents. Since we have the same information for individuals in this sample as we have in the non-Milwaukee sample, we have a means of judging the viability of transfer.

Schulze, William; McClelland, Gary; Doane, Michael; Balisteri, Ed; Boyce, Rebecca; Hurd, Brian; Simenauer, Ronald. 1995. "An Analysis of Stated Preferences for Superfund Site Cleanup." Department of Agricultural, Resource, and Managerial Economics, Cornell University. February 1995. **Keywords**: Conjoint Analysis.

This paper uses a random utility model of discrete choice to estimate the willingness to pay for alternative cleanup options at superfund sites.

Small, K.A. and H.S. Rosen. 1981. "Applied Welfare Economics with Discrete Choice Models." **Econometrica.** 49: 105-130.

Swait, Joffre; Louviere, Jordan. 1993. "The Role of the Scale Parameter in the Estimation and Comparison of Multinomial Logit Models." Journal of Marketing Research, volume: 30,

Pages: 305-314. **Keywords**: conjoint, stated choice methods.

If two sources of data (revealed preference and stated preference) are the outcome of a common choice process which differs only in the variability of the random component, utility parameters estimated from each data source should be proportional. This technical article shows how to estimate the ratio of the scale units in two or more data sets, and proposes a method to rescale one set of data against the second and test for a common choice process.

Swait, Joffre; Wiktor Adamowicz. 1997. "The Effect of Choice Complexity on Random Utility
        Models: An Application to Combined Stated and Revealed Preference Models." Working
        Paper, August 27, 1997. **Keywords**: conjoint analysis, choice complexity, random utility
        models, combined stated and revealed preference models.

This paper presents ana analysis of context effects on choice. Task demands are characterized and incorporated into random utility models of choice. Results indicate that task complexity significantly affects the variance of choice.

Thomson, C. l988. "Modelling Recreational Angler Decisions Regarding Fishing Area and Mode
        in the Context of a Nested Logit Model." Unpublished mimeo. National Marine Fisheries
        Service, La Jolla. CA. 18 pp.

Wegge, T.C., R.T. Carson and W.M. Hanemann. 1988. "Site Quality and the Demand for
        Sportfishing in South Central Alaska." Unpublished mimeo. Jones and Stokes Associates
        Inc. Sacramento, CA. 17 pp.

Wills,-Hugh. "A Note on Specification Tests for the Multinomial Logit Model."
        Journal-of-Econometrics; 34(1/2), Jan.-Feb. 1987, pages 263-74.

Choice probabilities generated by D. McFadden's (1973) random utility model are both multinomial logit and have the Independence of Irrelevant Alternatives (IIA) property. Various authors have suggested specification tests of this property. This paper identifies the alternative against which these tests are constructed and obtains classical specification tests. It is shown that both the null hypothesis and local asymptotic power of the classical tests is the same as for a proposed Hausman test. Finally the discussion throws some light on the nature of the IIA property and on the performance of the logit model in applications where one would expect the IIA property to be violated but where the alternative set is fixed.