Frontiers in Stated Preferences Methods: An Introduction

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1. Introduction

Over the last 30 years Stated Preference (SP) methods have become important for assessing individuals' demand for non-market goods, yet arguably no other method is as challenging to successfully employ. No other method requires the researcher to control for so many of the processes that precede and underlie traditional demand analysis. The application of revealed preference methods, for example, has typically involved selecting from the best pre-existing choice data and then selecting the optimal model specification. In addition to these research tasks, SP researchers are held accountable for the numerous processes that precede the creation of SP choice data as well as additional tests of validation once the choice data is created.

This special issue focuses on frontier areas in which SP researchers are required to make critical research-design decisions in the face of growing uncertainty in the literature. The authors and commentators in this issue clarify the trade-offs and consequences of these choices. They also offer new tools for diagnosing and, on occasion, the remediation of problems. We hope this review provides readers with insights into extensions of and improvements to the current literature.

We focus on four frontier areas in which researchers are required to make critical research-design decisions. First, SP researchers must construct the contextual frame of the choice occasion that gives rise to choice data. This involves choosing among alternative exchange institutions (e.g., types of markets, political referendum or informal preference-revelation modes) as well as controlling for a wide range of heuristics biases and related psychological processes. Second, SP researchers must design and present a choice set of alternatives from which each individual will choose. Although it is now well known that design of the choice set affects choices, researchers are still illuminating the exact consequences of these design choices. Third, SP researchers must contend with a considerable amount of individual heterogeneity because of the manner in which the ideal random sample is collected.

Several methodological approaches exist and more are emerging to address this issue, but the comparative merits of these approaches are unclear. Fourth, given the conditional nature of many demand estimates, SP researchers must confront the possibility that a collection of estimated models, rather than a single model, may best represent the "true" determinants of demand. However, how to responsibly represent this uncertainty is debated by researchers.

2. Laboratory Exploration of the Contextualization of the Choice Occasion

Like experimental economists, SP researchers attempt to design, or at least control for, an individual's contextual frames for the choice occasion under study. The central design element in any contextual frame is the exchange institution, which determines both the participatory rules and the allocative rules that individuals assume to operate during the choice occasion. Choice occasions may be shaped to reflect a wide range of exchange institutions, including various market mechanisms (e.g., take or leave purchases, auctions), voting processes (e.g., referendum) or more informal processes (such as opinion polls conducted by policymakers). The rules implied by each institution determine the consequences of the individual's choice, in terms of their expected financial costs and benefits. Researchers vary the completeness of institution-specific information for each type of institution, even providing them with prior experience and making choices in that context. Individuals may often use this contextual or experiential information in their assessment of the value of offered good(s). Researchers invariably frame the prospective choice occasion with respect to some constructed reference point, defining it as an opportunity for gains or to avoid losses.

Laboratory experiments offer SP researchers the opportunity to understand and control the consequences of these basic design elements of the choice occasion better. The first paper in this volume by Glenn Harrison, with commentary by Jayson Shogren, examines the role of experiments as complements to stated preference methods. Harrison provides a description of the contributions of experimental economics to the stated preference literature, focusing mainly on issues like hypothetical bias and techniques like "cheap talk." He then provides an outline of the ways that experimental methods could be used as complements to stated preference methods in the valuation of public goods. He provides a set of suggestions for practitioners and a guide to some of the research issues.

Shogren's discussion provides a somewhat different view of the main contributions of experimental economics and a different guide to researchers embarking on the use of experimental methods. He explores the role of laboratory experiments with the aim of (1) *ex ante* corrections in phrasing and survey design, (2) *ex post* calibration of valuation estimates, and (3)

analyzing the extent of other issues (e.g., rationality, effects of contextual cues). The main paper and commentary provide a set of issues and lessons, as well as an excellent set of background readings, for stated preference researchers. Experimental methods are not sold as a panacea in either the paper or the commentary. Rather, the authors provide guidance to the pitfalls as well as the potential gains from using experimental methods in tandem with SP methods.

3. Designing Choice Sets and the Structure of the Choice Occasion

Once the context for the choice occasion is well developed, SP researchers still face the daunting task of constructing the choice sets from which the individual will choose. Existing research has shown that changes in the design of a choice set, ceteris paribus, may systematically affect both the parameter estimates as well as the variances of the error terms (e.g., DeShazo and Fermo 2001; Arendtze et al. 2003). A related task is selecting the sequence of micro-choice occasions represented by each choice set, which needs to be consistent with the norms of exchange institution.

The second pair of papers examines issues in stated preference design, including experimental and survey design. David Hensher provides a systematic analysis of the effect of different design features. His paper raises questions about the extent to which cognitive factors, fatigue and perceptions interact with stated preference designs and responses. He discovers that design features do affect outcomes, particularly the choice of the range of attributes using in the task. Reed Johnson's discussion takes Hensher's results and attempts to relate the design features of the literature on framing and cognition. This pair of papers opens up an important research area that should provide a better understanding of the role of design in environmental valuation.

4. Accommodating Heterogeneity Among Individuals

With choice data finally in hand, SP researchers turn to the challenges of estimating models of demand. Access to disaggregate data provided by SP allows for in-depth analysis of individual heterogeneity. In the real world, individuals sort themselves according to product types (destinations such as beaches, hiking, fishing, etc), differences in product use (length of visit, on-site activity, group size) and into alternative institutions for purchasing any given product (e.g., word-of-mouth search and purchase, travel agent search and purchase, internet search and purchase). SP researchers often elicit measures of demand for a representative population that contains very heterogeneous preferences over aspects of the goods, their use and the institutions through which they are purchased. The failure to adequately

identify differences in the preferences of individuals may both bias estimates of demand and forego the opportunity to observe differences within the population at a higher resolution.

The topic of modeling preference heterogeneity has exploded in environmental valuation with the availability of algorithms for simulated maximum likelihood analysis. Techniques such as mixed logit and latent class models have become widely used to represent unobserved heterogeneity. The pair of papers by Morey, Thacher and Breffle and Provencher and Moore provides readers with a summary of the debate between continuous (mixed logit) and discrete (latent class) methods of reflecting preference heterogeneity. However, these papers go much deeper. Morey, Thacher and Breffle examine preference identification in attitudinal data that are routinely collected in surveys and show how such data could be combined with stated or revealed choice data. Furthermore, they enter into a debate with Provencher and Moore on the issue of endogeneity and heterogeneity in stated preference models. Most stated preference papers in environmental economics ignore issues of endogeneity that arises from the use of attitudinal or other "non-design" explanatory variables in econometric models. Morey, Thacher and Breffle outline the pitfalls of ignoring such endogeneity while Provencher and Moore discuss the issue as including choice related information (endogenous) versus deep preferences (exogenous). The debate provides practical advice to researchers and raises several important research questions.

5. Representing Uncertainty About the "True" Model via Model Averaging

Once a set of candidate demand models are estimated, the SP researcher faces a choice among a set of specifications allowed by the available data, functional forms and error structures suggested by the literature. The lack of a single dominant selection criteria begs the question: which is the "true model?" Or, more humbly, which subset of models best represents the set of "approximately true" models? This line of questioning in turn raises additional questions: Can and should the researcher represent the uncertainty around this set of approximately true models? If so, how would the researcher go about practically selecting among candidate models?

The final set of papers examines response format, data pooling and model averaging. David Layton and Todd Lee discuss the issue surrounding response formats (ratings, rankings and choice) in a statistically rigorous fashion. They then provide a state of the art overview of data pooling and the use of model averaging as a mechanism for providing robust estimates of preferences. Their paper focuses on "state of the world" stated preference methods and outlines some of the key issues involved in such approaches. They introduce stated preference practitioners to the use of model averaging

in the context of data pooling. Data pooling has been an on-again-off-again issue within the environmental valuation literature. Several recent papers have used data pooling to assess the degree to which different elicitation methods generate the same underlying preference structure (e.g., Cameron et al. 2002).

Layton and Lee raise the bar on such pooling efforts by providing rigorous non-parametric and parametric modeling averaging results. They also breathe new life into two historically avoided measures of elicitation: rating and ranking. While their paper provides an excellent overview of the statistical issues involved in elicitation method and modeling, the comment by Joffre Swait raises questions about the use of theory and expert judgement and the use of model diagnostics. Swait outlines how theory should be used to guide model averaging and why model averaging may not be suitable in applied or "practical" estimates of value. He observes that issues around cognition and cognitive burden, while not directly addressed in Layton and Lee, will also affect responses and generate difficulties for modelers.

6. Conclusion

We hope that this volume provides researchers with new ideas, new techniques, and a better view of the frontier of stated preference research. While stated preference is only one tool in the environmental and resource economist's tool kit, it is a complex tool that involves knowledge of economic theory, experimental design, survey design, data collection, and econometric analysis. Research in economics is complemented by work in psychology, marketing, transportation, decision theory and statistics. Economists are relative newcomers to some forms of stated preference research. We think that this volume illustrates the contributions that economists can make to this area. It also indicates the contributions that cross-disciplinary analysis can make to improving economic research. The overview paper by Jordan Louviere summarizes the papers in this volume and provides additional glimpses of the research frontier. As Jordan states in his summary, "In the future this special issue may come to be seen as the tipping point from which economists went on to research leadership in this field." We certainly hope so.

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