Forecasting the Market Potential for New Providers of Local Telephone Services to Business Customers

by Steven H. Cohen
President, Stratford Associates Marketing Research, U.S.A.
Donald A. Anderson
President, StatDesign, U.S.A. and
Jill Hesser, Market Manager, Research
U S WEST Inc., U.S.A.

Abstract

Deregulation is creating competition in the communications industry, allowing telephone service providers, media companies and other firms to offer everything from local telephone services to video-on-demand. Businesses are especially being targeted by alternate providers to switch services. Thus, predicting preference and likely market share for new competitors is a critical business issue. Existing and emerging providers need to understand what drives the choice process for their customers.

We present a case study of research conducted by U S WEST and Time Warner Communications to quantify the potential for medium and large corporations and government agencies to switch their business from the incumbent local telephone provider to companies offering similar services. Results are based on a survey of 1,300 telecom and datacom managers in twelve U.S. cities using a phone-mail methodology.

We describe our approach to predicting preferences and likely market share using a designed discrete choice experiment. We also show how customer preferences were combined with managerial judgments of the potential behaviors of likely competitors to predict share gains and losses using a dynamic diffusion model.

1. Introduction

Deregulation is opening up competition in the communications industry in the United States, Europe and beyond. The recently passed Telecommunications Bill in the United States will allow telephone companies, media companies and other enterprises to provide businesses and consumers a full range of offerings: from local telephone service to video-on-demand. The distinctions among phone companies, long distance carriers, cable TV providers and broadcast networks are disappearing fast.

The Baby Bells' best customers -- high volume, high margin businesses in concentrated, centralized locations -- are being targeted to switch their allegiance to alternate providers

This paper was presented at the 1996 ESOMAR Telecommunications Conference in the summer of 1996 in Paris, France. A short version of the paper was later presented at the American Marketing Association's Marketing Research Conference in October 1996 in Chicago, IL.

of local telephone services which are offering deep discounts and enhanced levels of services. As a result, alternate services, such as private leased lines, and switched services, such as business lines and trunks, are quickly becoming very competitive and could be sold like commodities.

Thus, predicting customer preference and likely market share for new telecommunication competitors is an increasingly important business problem for the incumbent provider and for the communications industry as a whole. Existing and emerging local telephone providers need to understand in depth what drives the provider choice process for their customers. It is critical to learn the roles played by service features such as brand, price, repair quality, installation speed, and number portability, to name just a few. Research is also required to estimate the potential share gains over time of the new competitors, given an infinite number of combinations of potential providers and competitive offerings in a complex and fast-changing marketplace.

This is a case study of research undertaken by U S WEST Inc. and Time Warner Communications (TWC) to quantify the potential of medium and large corporations and government agencies to switch their telecommunications business from their incumbent local telephone provider to competitors offering business lines and trunks and private leased lines. The research results are based on a comprehensive survey of over 1,300 telecom and datacom mangers in twelve cities in the U.S. The survey was conducted in mid-1995 using a telephone recruit followed by a mail survey.

We describe our approach to predicting preferences and likely market share outcomes for possible configurations of new providers of local telephone. We also show how these customer preferences are combined with managerial judgments of the behaviors of likely market competitors to predict share changes over time. Our goals are to:

- Discuss the use of designed discrete choice experiments and maximum difference experiments to explain and predict choice behavior;

- Show how we used a multinomial logit model to analyze the data and draw inferences about competitive effects in the local telephone service category;

- Specify a dynamic diffusion model which incorporates such effects as marketing intensity and coverage;

- Describe *Market Modeler*^{sm}, a Windows-based PC decision support model, that allows communications strategists and managers to easily simulate customer response to new competitive entrants and to changes in potential competitor offerings;

- Describe an *Excel*-based dynamic diffusion model that allows managers to simulate the share gains and losses over time of different competitors in a market; and,

- Discuss appropriately disguised results and conclusions from the U S WEST & TWC research.

2. Design of Discrete Choice Experiments

The stated preference discrete choice experiment is an approach used to understand, quantify and predict consumer choice behavior. This approach is known by some as choice-based conjoint analysis. The method is based on a rigorous and well-tested theory of consumer choice behavior, known as random utility theory (McFadden 1974). Batsell and Louviere (1991) characterize stated preference discrete choice experiments as including:

- Design of formal experiments that satisfy necessary and sufficient conditions for the estimation of probabilistic discrete choice models;
- Estimation of model parameters from data collected in such experiments;
- Tests of model specifications based on such experiments; and,
- Use of estimated models to forecast choice behavior in real markets.

We discuss each of these steps briefly.

The random utility approach to modeling preferences assumes that decision makers use some processing rule or utility function to integrate information about variables that describe choice alternatives. Variables that describe choice alternatives are called *attributes*; the values over which attributes range are called *levels*. Consistent with random utility theory, we assume that choices are the outcome of a utility maximization process in which individuals try to choose the best option for their own circumstances. That is, the customer's objective is to choose the product or service that is best for them, considering what they know about competing options and constraints on their choices. Such choices are stochastic from the analyst's viewpoint because a large number of events can influence choice aside from the attributes of product options. Hence, even if their choice options remain constant, consumers choices can be observed to vary.

The design of stated preference discrete choice experiments involves the following steps:

- Identification of the competitive market to be modeled;
- Identification of salient attributes and attribute levels for particular choice contexts;

- Selection of an appropriate statistical design method for combining attribute levels into descriptions of choice alternatives, and placing the choice alternatives into choice sets;

- Development of a good way (meaning, realistic and within the limits of human processing capabilities) to present the choice alternatives to individuals so that one can collect their stated preferences or choices;

- Selection of a procedure to measure individuals' stated preferences or choices most appropriate for a particular problem context;

- Choice of method for estimating a utility function(s); and,

- Development of a decision support system to make models actionable.

Designing Discrete Choice Attribute Tasks

Attributes that are managerially actionable and that influence choice are identified by in-depth interviews, focus group interviews, direct questioning, protocols and the like. Attribute levels are dictated by managerial objectives, and often are chosen so that they span the range of possible alternatives, including those observed in current choices and those that may be planned to be introduced in the near future.

Each attribute can take on several levels. For example, monthly price of service and installation charge might be the *same as now* or some *percent discount* from the current level; speed of repair might be *immediately* or *within five days*; customer service hours might be *24 hours a day* or *8 am to 5 p.m., Monday to Friday*. Each combination of attribute levels that fully describes a choice alternative is called a product or service *profile*. Profiles are generated by applying statistical design theory to create combinations of attribute levels. Each combination represents a different potential service offering. These combinatorial experiments are designed in such a way that the value or utility of each of the service attributes can be estimated independent of one another. Generally, a fractional factorial design is used for this purpose.

In particular, tasks in which respondents choose among described service alternatives require that first we create the service profiles that represent hypothetical alternatives, and then we place them into *choice sets*. Choice sets contain descriptions of two or more competing product profiles from which individuals will make a single discrete choice. Alternatively, they may be asked to allocate a fixed set of resources, such as the percent of their business' total phone lines or trunks. Choice sets usually are designed to satisfy the statistical assumptions of particular statistical choice models (e.g., the multinomial logit or MNL model) to insure consistent and efficient parameter estimation.

Although not required for this study, a major benefit of the discrete choice approach is the ability to present the respondent with alternatives which do not share features at the same levels. For example, in a recent study of cellular telephone pricing plans, we presented two alternatives to current customers representing a measured use calling plan and a flat fee calling plan. Note that the flat fee plan contained only one feature ? a price in the low hundreds of dollars, whereas the measured use plan was described by its monthly fee (in the tens of dollars), free peak and off-peak minutes, the price for peak and off-peak minutes, and so on. Thus, these two alternatives did not share features measured at the same levels. Traditional conjoint analysis approaches are unable to address managerial issues when alternatives do not share features. This is a major benefit of the discrete choice method.

Maximum Difference Task

In the U S WEST and TWC research problem, the potential new competitors to the incumbent local telephone providers include the interexchange carriers (AT&T, MCI, and Sprint), local cable TV providers, out-of-region Regional Bell Operating Companies (RBOCs), and several alternate providers (commonly termed ALTs or CAPs). We expected that there may be as few as three to as many as eight competitors in any market. The specific competitors that are likely entrants to a given market varied over the twelve cities studied, adding to the complexity of the project.

To meet this challenge, a *maximum difference brands-only* discrete choice task was developed that presented each respondent with eight sets of six brands each. In this task, each respondent was instructed to choose which provider was their *most preferred alternate local telephone provider* and if they would *seriously consider* the most preferred provider. The design allowed for the estimation of availability cross effects (Anderson and Wiley, 1992) to measure possible cannibalization and complementarity, based on which providers were actually competing in the market. Sixteen potential providers were tested in each city, with twelve brands common to all cities and four brands being specific competitors operating only in that or just a few cities. Respondents were also asked to choose their *least preferred* provider in each set, and the most preferred and the least preferred responses were used to estimate maximum difference brand scale values (Louviere, 1992). The outcome of this task is a set of interval level scale values which indicate the relative preference for each vendor.

Choice Sets

In this application, each choice set included four alternatives:

- Their current local telephone provider;
- A long distance carrier or a cable TV company in partnership with a long distance carrier;
- An *out-of-region* telephone company like a Regional Bell Operating Company (RBOC), a local cable company, or a partnership of the out-of-region RBOC and a local cable TV company; and,
- An alternate telephone provider, such as and ALT or CAP.

The profiles in each alternative were designed to produce an orthogonal main effects plan for the attributes, with selected interactions and attribute cross effects between the current provider and each competitor. The task for the telecom managers was to *allocate* their lines twelve months from now among the four alternatives presented. They could keep 100% of their lines with their current local telephone provider, switch 100% of their lines to any one competitor, or they could allocate their lines among the four alternatives.

The design allowed for estimation of *category of provider* specific-models and selected attribute cross effects. Sufficient brand information was included in the task so that the maximum difference brand choice task and the attribute allocation task could be linked to one another. As such, the parameters estimated in the maximum difference brand task were scaled to provide intercept and availability cross effect terms in the attribute task. The maximum difference brand task and the attribute allocation models were estimated assuming a multinomial *mother logit* model (McFadden, 1974).

Decision Support

The linked models were incorporated into the decision support system *Market Modeler*^{sm}, available from Stratford Associates. This decision support system, custom built in *Microsoft Visual Basic*, allows the user to simulate the effects of changes in features and pricing and the presence or absence of particular competitors within a specified market. Results can be generated for the market as a whole or for specific market segments. *Market Modeler*^{sm} can also search for the most optimal outcomes, based on highest predicted choice share, sales volume, or profitability of a particular scenario or line of services.

The user can also specify a *constrained optimization*, wherein certain features or prices are required to be at pre-specified levels. The model will then search for the most optimal

outcomes, subject to these constraints. All these features make *Market Modeler*^{sm} a extremely useful decision support tool for corporate and competitive strategy, product development, design, and pricing decisions.

3. Dynamic Diffusion Models

The results of the choice task represent a snapshot of what might happen in the long run. We realized that the attrition of the incumbent's share to competitive service providers might happen slowly, or fast, depending upon the investment made in infrastructure and promotion by the new providers. To model these phenomena, we turned to a dynamic diffusion model.

Diffusion models have a long history of use in new product forecasting, focusing on the role of communications channels in the growth of a new product or service. A comprehensive review is beyond the scope of this paper; the interested reader is referred to Mahajan, Muller, and Bass (1990). Briefly, buyers are hypothesized to be affected by two main forces:

- ***Innovation* or *external influence***, usually modeled as advertising and promotion expenditures; and,
- ***Imitation* or *internal influence***, usually thought of as the effect of word-of-mouth communications.

Our Proposed Model

Let S_t = Share of customers for a particular provider at the end of period t;

U_t = Preference for a particular provider, given 100% awareness and distribution, determined by the results of the discrete choice exercise;

C_t = Probability of seriously considering the provider in period *t*, which is a function of the provider's communications efforts and post-sales word-of-mouth; and,

D_t = Fraction of the market covered by the provider's service in period *t*.

The model for predicted share is:

$$S_{it} = U_{it} \times C_{it} \times D_{it}$$

In other words, predicted share for new vendor *i* in any time period is equal to buyers' preference for the new vendor, suitably deflated by consideration of the vendor (given advertising and word-of-mouth) and their market coverage. Given this relationship, the current provider's share at time *t* is:

$$1 - \Sigma S_{it}$$

Based on the anticipated vendors in a city, their features, prices, and so on, we estimate U_{it} from the results of the choice model. D_{it} is estimated by judgmental methods on a market-by-market basis, taking into account the anticipated market coverage of each competitive vendor.

Estimation of C_{it} is at the heart of the new service diffusion process, and is estimated by the following equation. In discrete time, the change in consideration from one period to the next is (omitting the subscript *i*) is:

$$C_t - C_{t-1} = [1 - C_{t-1}]\left[p_0 \frac{1 + p_1 X_t^a}{1 + p_2 Y_t^b} + qS_{t-1} \right]$$

where,

C_t is consideration for the vendor at the end of period *t*;

X_t is the intensity of marketing communications and promotional efforts during period *t* by the new entrant;

Y_t is the intensity of the communications and promotional efforts by the current provider to defend its share; and,

S_t is the size of the current customer base.

The model says that growth in consideration ($C_t - C_{t-1}$) from one time period to the next affects only that pool of customers ($1 - C_{t-1}$) who have yet to consider the new entrant. This pool of customers is affected by two components. The first term in the brackets at the right is the effect of the communications and promotion efforts of the new entrant, moderated by the defensive marketing efforts of the incumbent provider. The second term in the brackets represents the effect of word-of-mouth communications as they affect potential consideration. Thus, we need to estimate six parameters: p_0, p_1, p_2, q, a, and ß, where:

- p_0 is a constant term;

- p_1 is the multiplier for the marketing communications efforts of the new entrant (i.e. their coefficient of external influence);

- p_2 is a similar multiplier for the incumbent;

- a represents the nature of the marginal impact of the new entrant's communications on the rate of change of consideration;

- ß is a similar parameter for the incumbent; and,

- q is the *word-of-mouth* effect which only affects the vendor's previous share (S_{t-1}), and is the coefficient of internal influence.

All of these parameters were estimated as being either *type-of-firm-specific* or *alternative specific*. Coefficients for all CAPs were constrained to be equal (type-of-firm specific), while the coefficients for the interexchange carriers were estimated uniquely for each brand (alternative specific).

Estimation and Decision Support

Estimation of the model was accomplished in an all day *Delphi session,* where senior managers at US WEST and TWC were led through a series of questions which required their best judgment as to the competitive threat and strength posed by each potential competitor. Judgments were made anonymously, shared with the group, discussion ensued, and a re-estimation exercise was conducted.

To use the estimated model, we built an *Excel* spreadsheet that required business managers to define:

- The number of years included in the forecast;

- The number and names of telecommunications providers expected to be present in the market;

- The service and pricing configuration offered by each provider, yielding their predicted share at market saturation (output from *Market Modeler*);

- The type of each provider (a long distance carrier, a Regional Bell Operating Company, a nationally-known alternative provider, etc.);

- The percent of the market expected to be served by each provider, year by year); and,

- The expected intensity of the marketing effort from each competitor and the incumbent (Low, average, or twice average), year by year.

Given this information, the model calculates a series of diffusion curves, one for each new entrant and one for the incumbent.

4. Case Study: Market Potential for Local Telephone Services

Problem Description and Design Considerations

The particular problem of interest involves the introduction of new competitors in the already existing, mature, previously monopolistic service category of business local telephone services. The services considered were alternate services like private leased lines (DSOs, T1s and T3s) and switched services like business lines and trunks.

In this project, U S WEST and TWC needed to understand business and government customers' needs and behaviors when considering and purchasing local telephone services from alternate providers. U S WEST and TWC wanted to formulate both defensive and offensive strategies in the newly competitive marketplace.

In its own service region, U S WEST needed to defend its franchise. The firm was interested in answering three questions:

- Which customers should be targeted for retention activities?

- What changes could be made to protect the *at-risk* customer base, including the products and services offered, pricing, service quality, billing, trial offerings and network availability?

- What might be the potential share loss to alternate providers given likely competitors?

Out of U S WEST's service region, both TWC and U S WEST could become the new market entrant. Thus, in these areas, they were interested in finding out:

- Which customers should be targeted for acquisition?

- How should new products and services should be priced and configured?

- What might be their likely penetration be in selected markets?

Data Collection

Interviews were conducted with 1,300 telecom and datacom managers in medium and large corporations and government agencies in twelve cities in the US, using a phone-mail methodology. Approximately 900 respondents completed both the phone and the mail portion of the survey. Respondents were qualified as being responsible for or being very involved in making decisions related to the purchase of business lined and trunks and/or private leased lines for their organization.

An initial telephone survey lasting twenty minutes probed various issues of importance including awareness of alternative providers, satisfaction, loyalty, and organizational characteristics. Upon completion of the telephone survey, respondents were sent two questionnaires, one for the brand choice task and one for the service allocation choice task.

The choice problem was conceptualized as one in which a telecom manager would be offered choices among four local telephone providers. The categories of providers included in the allocation choice task were:

- Their current local telephone provider;
- A long distance carrier or a cable TV/long distance partnership;
- An *out-of-region* telephone company like a Regional Bell Operating Company (RBOC), a local cable company, or a partnership of the out-of-region RBOC and cable TV company; and,
- An alternate telephone provider, such as and ALT or CAP.

As noted above, the results of a brands-only choice task was linked to these provider categories in the attribute allocation task. In the brands-only task, respondents were asked to consider a list of six alternative providers of local telephone services and select the provider that they would most and least prefer for their business lines and trunks and their private leased lines. They were then asked whether or not they would seriously consider their most preferred company. Each respondent completed this task eight times, each time considering a different set of six providers.

Based on extensive qualitative research with business telecom and datacom managers and based on needs of US WEST and TWC, thirteen attributes were identified as critical to the delivery of business lines and trunks and private leased lines. These attributes represented offerings which were already in place, soon to be available in the marketplace or clearly possible in the near future. While all respondents were familiar with the services included in the survey, to insure that all terms were understood by all participants, we also included a *Glossary of Terms* in the mailing.

The attributes studied were as follows (where necessary, we have changed the attribute descriptions to protect the confidentiality of U S WEST and TWC):

1. Brand or provider category;
2. The monthly price of the particular service.;
3. The installation charge for the service;
4. Whether or not in-state and domestic long distance services are included;
5. Time required for installation;
6. Time required to service repairs;
7. Customer service hours;
8. Whether or not there was a single point of contact for the customer;
9. The format of the billing statement;
10. Whether or not service guarantees were available;
11. Whether or not they could keep their current phone numbers, should they switch to a new provider;
12. Whether or not a trial service period was offered; and,
13. Geographic area covered by service network.

Telecom managers were shown four *Allocation Decision Scenarios* for business lines and trunks and four scenarios for private leased lines. For each scenario, respondents were asked to consider *the most likely allocation of their business lines and trunks (or private leased lines) twelve months from now.*

In order to independently vary and test the effects of all attributes both within and between service options, we treated the problem as a fractional factorial design, with thirteen attributes, each at either two or four levels. As discussed by Louviere (1992) and Louviere and Woodworth (1983), one can measure and test for cannibalization effects between services by designing a choice experiment such that the attributes of competing alternatives are orthogonal within and between competing offerings.

We assume that the generalized or mother logit model is a good approximation to the unknown choice process used by the respondents. Our experimental design permits us to test this assumption. For example, if Mother logit were false and simple logit were true, we should find no statistically significant cross effects of the attributes of one service on the attractiveness or utility of another. Thus, the choice experiment was designed using a master design of 64 choice sets, placed into sixteen blocks of four, such that all main effects were orthogonal. Since each respondent evaluated four choice scenarios, there were sixteen different versions of the questionnaire.

Percentage allocation totals were aggregated across respondents for each service provider category in each choice set. Models for three types of business were estimated: medium and large businesses (defined by number of employees) and government agencies. These totals are the subject of the statistical analysis, discussed below.

Results

The parameters of a mother logit model were estimated from the telecom managers' allocation data. This model contained parameters for all of the *own* effects (price was modeled as a linear and quadratic effect), cross-effects of the four provider categories, and cross-effects of the attributes of the four services on each other. The model was then pruned by eliminating insignificant effects until we arrived at the final model in which all effects are significant. The final model is highly significant by conventional statistical standards, representing a large improvement over a null model.

Our results show that providers of business local telephone services should concentrate on price, speed of repair, network availability, trial options and long distance services. Price is one of the most critical drivers of switching behavior; there appears to be a high risk (or opportunity) associated with any price gap between the incumbent telephone provider and potential competitors. Business and government customers are also very sensitive to the speed of repair, especially on *mission critical* private leased lines and switched services. Other critical attributes include network availability, long distance services and trial options. The individual service quality attributes do not play a large role in the decision process.

The role of brand in the choice process is less intuitive. In the brands-only task, respondents were asked to select which provider they would most prefer for business lines and trunks and private leased lines. They were they asked whether or not they would seriously consider their most preferred company. As would be expected, the long distance providers had the highest utility relative to the other alternate providers, followed by the Baby Bells and local cable TV providers, ALTs and CAPs. Substantial differences in utilities surfaced by city, reflecting the differences in providers' presence. Interestingly, however, the role of brand diminished substantially once these results were meshed with the attribute allocation task, where price and service levels drove telecom managers' choice behavior. This latter finding suggests that private leased lines, and to a lesser extent business lines and trunks, could become commodity-like services among business customers.

Cross-effects measure the extent to which we can expect share draws over and above that expected by a “fair share” model. The results suggest that services provided by one of the long distance carriers will not cannibalize the shares of the other two beyond its fair share, because there were not significant cross-effects on the shares of the other two providers. However, the two other carriers do cannibalize each other more than fair share, when both are present in the marketplace. This finding confirms earlier research, which found that these two carriers were positioned similarly in the minds of telecom managers. No other significant cross-effects surfaced.

5. Discussion and Conclusions

The study results were used to create a decision support system which U S WEST and TWC managers used to evaluate various competitive alternatives. Predicted market share results were then used in the diffusion model to predict the growth in competitors' share over time. These decision support systems allow U S WEST and TWC to predict how the telecom managers studied would likely choose among competitive service offerings at various prices and service levels.

Some data currently exists to validate the model. Given recent competitive offerings in the cities studied, U S WEST used the decision support systems to estimate current market share. Our equations replicated external estimates of market share within the confidence limits of the forecast errors. Thus, we can tentatively conclude that the model replicates current behavior to a reasonable approximation.

6. Summary

In the highly competitive telecommunication marketplace, market research is necessary to help managers understand alternative courses of action. This study describes a successful effort to incorporate traditional data collection techniques, advanced marketing science models, and managerial judgments about competitive actions and threats to help guide corporate strategy.

Choice-based conjoint analysis was demonstrated as a powerful technique to understand buyer preferences for the services and prices available from competitive companies in a marketplace. This learning, however, needed to be supplemented by a tool that allowed management to predict share gains and losses over time, given the likely entry of new competitors. A dynamic diffusion model served this purpose.

The lines of competition in the telecommunications market have been redrawn as a result of the recent U.S. telecommunications bill. As new vendors spring up, market research can aid in understanding the opportunities and threats offered in the marketplace.

References:

Anderson, Donald A., and James B. Wiley (1992). Efficient Choice Set Designs for Estimating Availability Cross-Effects Models. Marketing Letters 3:4, 357-370.

Batsell, Richard R. and Jordan J. Louviere (1991). Experimental Choice Analysis. Marketing Letters, 2:3, 199-214.

Carson, Richard T., Jordan J. Louviere, Donald A. Anderson, Phipps Arabie, David S. Bunch, David A. Hensher, Richard M. Johnson, Warren F. Kuhfeld, Dan Steinberg, Joffre Swait, Harry Timmermans, and James B. Wiley (1994). Experimental Analysis of Choice. Marketing Letters, 5:4, 351-368.

Lazari, Andreas G. and Donald A. Anderson (1994). Design of Discrete Choice Set Experiments for Estimating Both Attribute and Availability Cross Effects. Journal of Marketing Research, Vol. 31, 375-83.

Louviere, Jordan J. and George Woodworth (1983). Design and Analysis of Simulated Consumer Choice or Allocation Experiments: An Approach Based on Aggregate Data. Journal of Marketing Research, Vol. 20, 350-367.

Louviere, Jordan J. (1992). Maximum difference conjoint: theory, methods, and cross-task comparisons with ratings-based and yes/no full profile conjoint. Unpublished working paper. Department of Marketing, Eccles School of Business, University of Utah, Salt Lake City, Utah.

Mahajan, Vijay, Eitan Muller, and Frank M. Bass (1990). New Product Diffusion Models in Marketing: A Review and Directions for Research. Journal of Marketing, Vol. 54, 1-26.

McFadden, Daniel (1974). Conditional Logit Analysis of Qualitative Choice Behavior. Frontiers in Econometrics, P. Zarembka (ed.). Academic Press, New York, pp. 105-142.

About the authors:

Steven H. Cohen is President, Stratford Associates Marketing Research, U.S.A.

Donald A. Anderson is President, StatDesign, U.S.A.

Jill Hesser is Market Manager, Research at U S WEST Inc., U.S.A.