Stated Choice–Based Performance Evaluation of Selected Transportation Control Measures and Their Transfer Across Sites

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The stated-preference approach to demand forecasting is gradually coming of age. Despite inherent problems with scaling factors, dynamics and IIA, data-generation approaches relying on hypothetical-choice set experiments continue to grow in use. Previous models have demonstrated construct validity and reproducibility over time. The current research examines the transferability of stated-preference models across target populations residing within the same transportation network. Two employment sites in northeastern New Jersey provide the setting. The stated-choice approach is tested for consistency when applied to different sites. The sites are not identical, nor are the instruments. These differences become the basis for developing a set of alternative hypotheses that test for structural differences between the two models. The strategies of transportation-demand management proposed for implementation at both sites are essentially the same. The differences arise for the most part from the availability of off-site transportation resources to each site's employees. One site is in a relatively isolated suburban setting that has little public mass transportation and no off-site parking. The other site is an urban facility with access to public mass transportation and off-site parking. The stated-choice models estimated at the two sites have essentially the same structure. Where site-specific conditions are comparable, the logit coefficients are statistically identical; where the site-specific conditions differ, the coefficients differ in the direction predicted by theory.

The Clean Air Act Amendments (CAAA) of 1990 require the preparation of employee trip reduction compliance plans. The plans must commit an affected employer to a set of employee commute option (ECO) strategies. The plans must demonstrate convincingly the effectiveness of the strategies (Section 108f, CAAA). Most often, the evidence for their effectiveness comes from case histories without controls (*1*). Efforts such as these provide overall guidance by describing the outcomes of the application of groups of strategies. Issues of research design, validity, reliability, and transferability tests are rarely addressed. Efforts to transfer the quantitative performance estimates from such studies have been known for their lack of success (*2*). This study explores an alternative approach to performance evaluation. It is one of a series of studies extending the use of stated-choice techniques to transportation-demand modeling and mode-choice forecasting.

Stated-choice models are based upon the mode-choice decisions of individual commuters. The models are estimated based on the real commutes employees make in real transportation corridors. They differ from traditional demand-forecasting models in that hypothetical ECO strategies are overlaid on the existing transportation network. Survey research techniques are used to extract from individual commuters their choice of commuting mode given hypothetical but realistic values for the time, comfort, cost, and convenience of each proposed commuting alternative.

Validity and transferability issues have been addressed in stated-choice models. Stated-choice forecasts have been favorably compared with revealed choices under several travel conditions in England (*3*). Comparison of stated-choice with revealed-preference commuting choices awaits the arrival of appropriate data. The reliability of stated-choice results when repeated studies are performed at the same site has been affirmed (*4*). However, the issue of transferability has yet to be addressed. The report that follows examines two stated-choice models designed to forecast the impact of ECO strategies on mode-choice decisions.

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EXPERIMENTS

Commuting-choice experiments were performed at two employment sites in the New York metropolitan area. The first experiment occurred at the Matsushita Electric Corporation of America's (MECA's) headquarters facility at Secaucus, New Jersey, during the spring of 1992. The MECA study has been reported in detail in (*4*). The second experiment occurred at the Port Authority of New York and New Jersey Technical Center (PATC) in Jersey City.

The methods used to design, test, administer, and analyze the results were identical. The initial stated-choice questionnaires were created in the laboratory of the New Jersey Institute for Transportation (NJIT). The data to be generated through each survey instrument were tested for applicability to the multinominal logit model using simulation techniques (*5*). Focus-group meetings were held to explore the relevance and appropriateness of the draft instruments. Revisions were made and the new instrument was pilot-tested on 15 to 24 employees at each site. The final instrument was administered using each site's mail system to distribute the instrument to a randomly-selected sample of commuters.

The response rates obtained for the MECA and the PATC surveys differ from each other, reflecting the different conditions under which they were administered. A randomly selected sample of 133 drive-alone PATC employees were sent stated-choice surveys on May 26, 1993. Within 1 month, 62 were returned completed. Two response-enhancement letters were sent to the employees included in the sample. After 2 weeks, an additional 17 surveys were returned. The total response rate for PATC was 59.4 percent. The MECA response rate for surveys administered under the same conditions as the PATC survey was 44.6 percent; however, 38 surveys were rejected due to noncompensatory responses on the part of the respondents (*4*). The effective response rate for MECA was 32 percent. The different response rates reflect the authoritative intervention by top management into the survey-administration process at PACT. The MECA survey received written support from a top member of the management team; however, completion of the survey was not made an important objective as it was with PATC management.

While the underlying methods were the same, specific elements of the two experiments were not identical. The MECA experiments provided commuters with two commuting alternatives: single-occupant vehicles (SOVs) and rideshare. The rideshare alternatives were defined in the experiment as either carpool or vanpool. The PATC experiment presented commuters with three alternatives: SOV, carpool, and vanpool. Another difference is found in the attribute representing benefits given to rideshare commuters. The MECA experiment presented commuters with a subsidized meal in the corporate cafeteria valued up to $3.00 per day, while the PATC study offered commuters up to a $3.00 per day tax-free transportation benefit to vanpool users. The availability of alternative parking identifies a third difference between the two sites and studies. The MECA location has an abundance of free on-site parking but essentially no off-site parking; on the other hand, the PATC site has an effective constraint on on-site parking, but has access to local on-street parking. Most PATC employees report that they have experienced the need to park on the street or in private lots found within a 15-min walk of the work site. (*6*).

The employee characteristics of the two employment sites differ as well. The MECA-headquarters site has approximately 2000 employees. The PATC site has 566 employees. Approximately 80 percent of the employees of each site are male. Roughly 89 percent of MECA employees commute using an SOV. Its average passenger occupancy (APO) is estimated to be 1.08; in contrast, 51 percent of the PATC employees use SOV, yielding an APO of 1.36.

Transportation Control Measures

The transportation control measures (TCMs) examined in this study consist of parking-management policies such as parking charges and parking space availability, rideshare incentives such as transportation benefit payments or subsidized meals, guaranteed ride home programs rated at several levels of convenience, and the implicit effectiveness of the employee transportation coordinator. The stated-choice method generates performance data by asking employees a complex set of hypothetical commuting-choice questions. In the case of the PATC study, a sample of employees was shown a set of three commuting options: SOV, carpool, and vanpool. Parking-management policies, subsidies (when available and at a specific value), guaranteed ride home, and similar factors characterizing each commuting option were shown to the respondent. After reading these descriptions, the employee was asked to choose the commuting alternative he or she would use under actual commuting conditions. An example of one choice task is shown in Figure 1; the full survey instrument is available from the authors. Employees were given 16 choice tasks; each choice task was prepared using fractional factorial design tables where interaction effects among the design variables are assumed to be negligible and the values of the characteristics form orthogonal independent variables (*7*). The data base from the completed surveys was constructed and the conditional logit program ALOGIT 3.2 was used to compute the importance of each TCM toward the choice of a commuting alternative (*8*).

Analytical Model

The commuting decision is modeled as a rational process. Each employee-commuter chooses one alternative among those presented in each choice task. The selection process is based on the explicitly or implicitly stated costs and benefits shown in each choice task. Tests for lexicographic decision processes are used to detect non-rational or noncompensatory decision-making processes (*9*); when a noncompensatory process is found, it is removed from the data base. The costs and benefits shown in each choice task form the design attribute subset of independent variables. The second subset of independent variables consists of socioeconomic, demographic, and attitudinal indicators. In the case of the PATC study, each stated choice made by an employee is combined with a comparable set from the other employees in the sample to form a multinomial dependent variable. The MECA model has a binomial dependent variable.

The underlying analytical model describing the outcomes of PATC employees' commuting decision-making process is the multinomial logit. The model combines the discrete decisions of individual commuters into a choice probability for each alternative. The fundamental assumption underlying the use of this model is the Luce axiom regarding the independence of irrelevant alternatives. For the conditional logit to be the basis of unbiased estimators, it is assumed that the ratio of the probability of choice for any two alternatives is independent of all other alternatives.

The conditional logit model is

$$P_i = \frac{eV_i}{e_i^V + e_j^V + e_k^V} \qquad (1)$$

where P_i is the probability that an individual n in the target population will choose one alternative from a choice set containing alternatives $\{i, j, k\}$, and V_i, V_j, and V_k represent, in linear parameters, indirect utility functions for each alternative. The indirect utility functions are shown in Equation 2:

$$\begin{aligned} V_i &= \alpha_0 + \alpha_1 X_1 + \cdots + \alpha_m X_m + \varepsilon_{i,n} \\ V_j &= \beta_0 + \beta_1 W_1 + \cdots + \beta_m W_m + \varepsilon_{j,n} \\ V_k &= \gamma_0 + \gamma_1 Z_1 + \cdots + \gamma_m Z_m + \varepsilon_{k,n} \end{aligned} \qquad (2)$$

The set of coefficients $\{\alpha, \beta, \gamma\}$ represents the alternative specific constants, the marginal utilities assigned by commuters to each design attribute, and the shifts in the alternative specific constants generated by individuals through their socioeconomic and attitudinal indicators. The coefficients $\{\alpha_m, \beta_m, \gamma_m\}$ are interpreted as marginal utilities linking a change in one unit of an attribute $\{X_m, W_m, Z_m\}$ to the change in utility experienced by individual n holding income constant.

Test for IIA Assumption

The Hausman specification test is used to test for the IIA assumption (*10*). The test involves the preparation of two logit equations.

Experiment Code SOVCPVP

If you were presented with the following three alternative ways to commute to the Port Authority Technical Center beginning in June 1993, which one would you choose to use?

Alternative 1. Drive alone	Value of Characteristic
Parking space fee per day at PATC	You pay nothing
Parking space availability	first come first serve in Lot 2

Alternative 2. Carpool (Pickup and drop off at your home)

Vehicle leaves PATC for home at	5:04 p.m. sharp
Parking space charge at PATC	You pay nothing
Extra time for ridesharing	5 min for each one way trip
Guaranteed ride home	None offered
Carpool subsidy	None offered
Guaranteed parking spot in lot:	Lot 1

Alternative 3. Vanpool (Pickup and drop off at your home)

Van leaves PATC for home at	5:04 p.m. sharp
Parking space change at PATC	You pay nothing
Extra time for ridesharing	5 minutes for each one-way trip
Guaranteed ride home	None offered
Vanpool subsidy	You are paid $3.00 per day
Guaranteed parking spot in :	Lot 1

After comparing the characteristics of the three alternatives shown above, I choose:

****Please check one and only one alternative****

Drive alone ( )

Carpool with other PATC employees ( )

Vanpool with other PATC employees ( )

FIGURE 1 One of 16 choice tasks presented in stated-choice experiment.

The first is the unrestricted model containing all of the choice alternatives; the second model is restricted in that one of the alternatives is removed.

The null and alternative hypotheses are

$$H_0: \beta = \gamma$$
$$H_a: \beta \neq \gamma \quad (3)$$

where β represents the logit coefficients taken from the unrestricted model, and γ represents those taken from the restricted model.

The Hausman test permits the rejection of the null hypothesis when

$$[\gamma - \beta]'[V_\gamma - V_\beta]^{-1}[\gamma - \beta] \geq \chi^2_{1-\alpha,r} \quad (4)$$

where

$[V_\gamma - V_\beta]^{-1}$ = inverse of difference between variance covariance matrix for restricted and nonrestricted models, respectively;

α = significance level, and

r = number of parameters in restricted model.

Specification of Logit Models

The logit model requires that variables representing attributes of the TCM programs and the socioeconomic characteristics be assigned to each alternative's utility function. From the point of view of the choice experiment, the attributes and their values provide the information for the respondent to distinguish one alternative from another. From the point of view of the logit model, the attributes are the independent variables used to specify the utility functions.

Both the PATC and MECA studies provided employees with a set of design variables representing ECO programs and at the same time elicited from their respective employees a set of socioeconomic and available transportation resources. The MECA model has been presented in a previous paper (*4*); therefore, only the PATC model will be described in detail.

Four socioeconomic-regional transportation variables were used to provide the conditions underlying the PATC's employees' decision-making process regarding their commutes. At the final estimation of the model, all of these variables were entered into the SOV utility function. Household income was entered in order to account for the positive income elasticity of demand for driving alone. Perceived availability of parking spaces was included to reflect the supply of parking at the PACT site. This characteristic was specified by asking employees if they felt they had an assigned parking space. Approximately 40 percent of the employees returned a positive perception. Discussions with PATC's facility manager revealed that no formal parking assignment policy exists for the site. Accurate or not, the perception of a right to an on-site parking space must be considered the basis for the initial commuting decision. Therefore, the perception of an assigned parking space should result in a positive marginal utility for the SOV mode.

Two additional variables specify the employees' perception of the utility and convenience of public mass transit. When employees use public mass transit on a usual or an occasional basis, knowledge of the commuting alternative will lessen the sense of being captive to the SOV. Therefore, it is assumed that occasional use of the transit alternative will reduce the marginal utility of the SOV mode. Alternatively, for employees who never use public mass transit, the SOV mode will have a positive marginal utility. The use of public mass transit is conditioned on its cost. The final background variable retained for the model is the number of transfers employees must make when using public mass transit. The greater the number of transfers needed for the commute to work, the higher the cost of transit in terms of time, comfort, convenience, and fare; therefore, the higher the positive utility attached to the SOV mode.

Stated-Choice Equation

Table 1 displays the conditional logit equation for the PATC model. Assuming that the error covariance for the responses to the stated-choice tasks both for individual respondents and across respondents is zero, the coefficients reported in the table are statistically significant at the 0.05 level and have signs that are considered theoretically correct. The equation obtains a $\bar{\rho}^2$ statistic of 0.23, well within the desired range of 0.2 to 0.3. The IIA assumption was tested with the Hausman test. The χ^2 value of 5.36 was not in the critical region of the χ^2 statistic given 9 degrees of freedom; therefore, IIA is not rejected. Thus, the use of a nonnested logit model is assumed appropriate for examining the logit choice process for SOV, carpool, and vanpool alternatives.

The logit equation is partitioned into its three commuting equations: SOV, carpool, and vanpool. The design variables are reported at the beginning of each partition and are highlighted. The variables used to specify the socioeconomic segments of the model are placed at the end of the SOV partition. Each of the socioeconomic variables generates utility coefficients with signs predicted by theory. Household income, having an assigned parking spot, and never using public transit have a positive stimulus on the use of SOV. Similarly, the need to transfer when using public transit also has a positive influence on the utility of the SOV mode. All of the socioeconomic variables tested and used in the final model influence the level of SOV use.

Seven TCM design variables are included among the three modal equations. The SOV component of the logit equation has two design variables: parking charges and the nominal variable, defined as availability of parking spaces in the PATC lots when the employee arrives at work. Parking charges reduce the utility found in the SOV mode, while parking space availability increases utility.

TABLE 1 Conditional Logit Equation for Commuting-Choice Decisions Made by PATC Employees Who Currently Drive Alone to Work, Spring 1993

Attribute	Logit Coefficient	t score
Single Occupant Vehicle		
Parking Charges at PATC	-0.16	3.9
Parking spaces available	0.54	4.3
Household Income	0.000017	6.7
Employee has assigned Parking Space	0.47	3.5
When taking transit, employee uses Park and Ride lot	-1.37	8.5
When taking transit, employee is dropped off at stop	-0.85	4.5
Number of transfers employee must use when taking transit	0.34	7.2
Carpool Equation		
Extra time consumed carpooling in comparison to SOV	-0.037	3.0
Guaranteed Ride Home Program at PATC	1.13	5.6
Extra time spent using GRH service over SOV	-0.016	2.1
Vanpool Equation		
Guaranteed Ride Home Program at PATC	1.13	5.6
Extra time spent using GRH service over SOV	-0.016	2.1
Extra time spent consumed vanpooling in comparison to SOV	-0.048	4.7
Vanpool subsidy ($)	0.29	5.3

Equation Statistics

Initial Likelihood	-1342
Final Likelihood	-1037
Rho bar squared	.23
Chi square (IIA test)	5.36
Chi square, df=9, significance level=0.05,	16.9

The carpool equation contains three design variables. First, the existence of a guaranteed ride home program increases the utility of the carpool option, while time spent waiting either for the carpool or for the guaranteed ride home acts as a negative weight for carpooling. The vanpool equation has four design variables. By design, the coefficients for the guaranteed ride home program are the same for both rideshare options. Similar to the carpool model, extra time spent in the vanpool over that spent driving alone has a strong negative influence on the vanpool option. The final policy variable relates to the qualified transportation benefit program. The coefficient is strongly positive, indicating the price-sensitive nature of the vanpool option.

Forecasting Effectiveness of TCM

The logit model derived from the PATC employees' stated choices is used to construct a series of modal split forecasts. The percentage of employees choosing to commute by SOV, carpool, and vanpool is computed for various ECO policies. Seven scenarios are constructed and shown in Table 2. The first scenario represents the current situation, in which essentially all employees in the model commute using the SOV. That is, no parking charges, vanpool fringe benefits, or guaranteed ride home programs exist, parking spaces are available, and employees perceive that an extra hour of time is wasted using either the carpool or vanpool option. The APO derived from the first scenario is 1.0 persons per vehicle. This is appropriate in that the actual APO for the employees in this sample is 1.0.

Scenario 2 identifies one of a set of commuting-management strategies that will result in the PATC meeting the trip-reduction requirements of the Clean Air Act. The set of strategies includes a $2.00 per day parking charge, a guaranteed ride home rated at 15 min lost time over a personal vehicle being available, an average of 15 min additional time spent commuting for carpoolers and 30 min for vanpoolers. Lastly, there is a $3.00 transportation benefit payment given to those employees who join a qualified vanpool. Scenario 2 is forecast to raise the site's APO from 1.00 to 1.62.

Parking charges are known to be difficult to implement. Scenario 3 allows employees to retain their free parking while leaving all other variables at the levels shown in Scenario 2. The percentage of employees who use SOV rises to 54 percent from its target level of 46.8 percent and the projected APO declines from 1.62 to 1.49. Scenario 4 returns to the $2.00 parking charge but removes the guaranteed ride home from Scenario 2. This scenario increases the use of the SOV to 66.2 percent while dropping the APO to 1.32. Scenario 5 explores the impact of ineffective rideshare matching at the site. Ineffective rideshare matching means that the employee transportation coordinator has not succeeded in finding rideshare matches that will reduce the average effective time lost ridesharing (compared to SOV) to less than 1 hr. As a result, the projected APO declines to 1.30. Scenario 6 removes the transportation subsidy from vanpooling. The result is a drop in the percent vanpooling from the target level of 26.3 percent to 13.3 percent, and a drop in APO from 1.62 to 1.42.

Tests for Transferability of TCM Coefficients

Transferability of the logit model's utility coefficients is a relative property. Where validity and reliability reflect the properties of a target population and its sample, the property of transferability reflects a model's ability to be applied to other populations. The question is not so much whether a model is transferable but rather under what conditions it can be transferred.

The conditions surrounding the administration of the stated-choice instruments differ across the two sites reported in the study. Consequently, the structure of the logit models for PATC and

TABLE 2 Projected Modal Split for Employees Who Currently Drive Alone to PATC

Scenario Subsidy	Parking $	Parking Charge Available	Guaranteed Space Home	Time lost Ride GRH	Time lost Using the Carpools	Time lost Using Vanpools	Vanpool Using $
1	0	1	0	0	60	60	0
2	2	1	1	15	15	30	3
3	0	1	1	15	15	30	3
4	2	1	0	0	15	30	3
5	2	1	1	15	60	60	3
6	2	1	1	15	15	30	0

Scenario	% SOV	% Carpool	% Vanpool	APO	Comments
1	100.0 %			1.00	Current
2	46.8%	26.9%	26.3%	1.62	ETR Goal*
3	54.3	23.1	22.6	1.49	No Parking Chg.
4	66.2	17.1	16.7	1.32	No GRH
5	58.6	6.6	34.7	1.30	Poor matching
6	54.3	32.3	13.3	1.42	No Subsidy

*Employee Trip Reduction goal is expressed as the increment to APO obtained from single occupant vehicle drivers. It is assumed that the PATC employees who currently use bus and rideshare continue that pattern. The combined APO for the site is therefore 1.97.

MECA will differ. It will be more appropriate to determine whether the coefficients differ in theoretically predictable directions.

In comparing the two studies, the null hypothesis asserts that the marginal utility estimates for TCMs will be identical across the two models. Two alternative hypotheses control the tests for transferability.

- Hypothesis 1: Given the existence of alternative parking at the PATC site and little or no parking at the MECA facility, parking management programs such as parking charges will have a higher disutility at MECA than at PATC.
- Hypothesis 2: A rideshare incentive that requires the commuter to consume an assigned good or service not directly related to transportation services will have a lower marginal utility than a monetary incentive directly tied to the consumption of transportation services. Consequently, the subsidized lunch for ridesharers at MECA will have a lower marginal utility than an equivalent payment for rideshare services at PATC.

The remaining TCMs such as the guaranteed ride home and the marginal disutility of time lost ridesharing are hypothesized to hold constant across the two models.

Individual TCM coefficients across the two models are tested using an asymptotic *t*-test (*10*). The test is

$$t = \frac{\beta_k^1 - \beta_k^2}{[\text{var}(\beta_k^1) + \text{var}(\beta_k^2)]^{1/2}} \qquad (5)$$

where

β = parameter estimate for TCM *k*,
(var) = variance operator, and
superscripts = MECA and PATC models.

Table 3 presents the coefficients for comparable TCMs across the two models. Alternative hypothesis 1 is accepted. Parking charges have a much greater impact on the utility of driving alone at MECA than they do at PATC. However, given the quadratic form of the MECA parking-charge term, its marginal impact on driving alone diminishes with increases in the parking charge. This may suggest the existence of subsets of employees who respond differently to parking charges.

Figure 2 graphically displays the role of off-site parking availability in the performance of parking charges. The design variables for both the PATC and the MECA models were set to a roughly equivalent baseline value. Rideshare incentives were set at zero a guaranteed ride home program rated at a 25-min wait time, and time lost ridesharing set at 22 min. The base case has no parking charge. In this case MECA has 80 percent of its employees commuting by SOV, and PATC has approximately 58 percent. Next, let on-site parking charges be instituted. At a charge of $2.30 per day, both sites have the same percentage of commuters arriving at work by SOV. The $2.30 charge has reduced the MECA drive-alone levels by 30 percent. PATC, on the other hand, has had its drive-alone levels reduced by 6 percent. Where off-site parking exists such as that surrounding PATC, the parking charge appears to do little to affect

TABLE 3 Logit Coefficients Derived for TCMs Given to Employees of PATC and MECA in Separate Stated-Choice Exercises

Transportation Control Measure	PATC Coefficients	MECA Coefficients
SOV Alternative		
Parking Charge	-0.16	-0.81*
Parking Charge Squared	0	0.047*
Carpool-rideshare		
Extra time consumed ridesharing over SOV alternative	-0.037	-0.041
Guaranteed Ride Home with a 25 minute wait time	1.13	0.99
Vanpool-rideshare		
Extra time consumed ridesharing over SOV alternative	-0.048	-0.041
Transportation Benefit subsidy	0.29	0.29
Transportation Benefit subsidy squared	0	-0.018*

*t score obtained from the difference of estimators is significant at the 0.05 level.

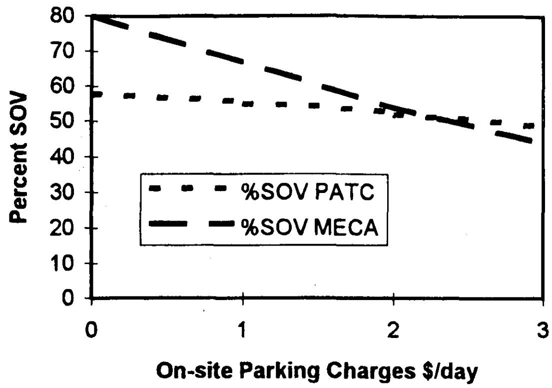

FIGURE 2 Off-site parking effects on performance of on-site parking charges.

the percentage of employees using the SOV mode for their commute. On the other hand, where off-site parking is not a feasible alternative, the imposition of parking charges such as those tested at MECA will have a strong impact on commuting behavior.

Alternative hypothesis 2 is also accepted. The impact of the rideshare subsidy on commuting-mode choice depends on the form of the incentive. The subsidized lunch in MECA's cafeteria has a diminishing marginal utility over the range of cash values used in the study. On the other hand, PATC's dedicated cash payment for transit and qualified vanpools does not diminish in its effectiveness in increasing vanpool use over the range of payments studied. The remaining coefficient comparisons confirm the null hypothesis. Delay time brought about by either form of rideshare has the same disutility with time lost across both sites. Similarly, the marginal utility of a guaranteed ride home program is essentially the same across both sites.

CONCLUSIONS

Two employment sites in northeastern New Jersey provided the setting for an experiment in transportation-demand measurement. The stated-choice approach to the measurement of discrete choice is tested for consistency when applied to different sites. The sites are not identical, nor are the instruments. These differences become the basis for developing a set of alternative hypotheses that will test for structural differences between the two models. The transportation-demand management strategies proposed for implementation at both sites are essentially the same. The differences arise for the most part from the availability of off-site transportation resources to each site's employees. One site (MECA) is in a relatively isolated suburban setting that has little public mass transportation and no off-site parking. The other site (PATC) is an urban facility with access to public mass transportation and off-site parking. The stated-choice models estimated through a standard logit process have essentially the same structure. The coefficients of transportation-control measures presented to each site are for the most part identical. The marginal utilities estimated for a rideshare matching program and a guaranteed ride home program are essentially the same. The rideshare incentive program that was implemented as a subsidized lunch at the MECA cafeteria has a lower marginal utility with respect to the face value of the subsidy than does the direct subsidy payment for transportation services. However, this difference is slight. The major difference between the two models comes from their parking charge coefficients. The site with no off-site parking available to employees is much more sensitive to parking charges than the site with off-site parking on the street.

In the evaluation of any new analytical technique, reliability and consistency are essential properties. With the completion of this study, stated choice has been shown to possess in two paired studies the properties of reliability and transferability. This is an important beginning; however, additional studies by other researchers in different parts of the country are needed to further test the conceptual soundness and empirical stability of stated choice. Clearly an essential step will be to perform validity tests using revealed-preference techniques simultaneously with stated-choice tests.

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