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NETHERLANDS MODE CHOICE CASE

This Case study deals with the estimation of a mode choice behavior model for intercity travelers using revealed preference data. The survey was conducted during 1987 for the Netherlands Railways to assess factors that influence the choice between rail and ar for intercity travel.

Context

Nijmegen is a small city in the eastern side of the Netherlands near the border with Germany. The city has typical rail connections with the major cities in the western metropolitan area called the Randstad (that contains Amsterdam, Rotterdam and The Hague). Trips from Nijmegen to the Randstad take approximately two hours by both rail and car. A binary choice model can be developed to model the mode choice of travelers for intercity travel.

Data Collection

This dataset was collected by a survey conducted in this corridor during 1987 by the Netherlands Railways to assess factors that influence the choice between car and rail. The sample consisted of residents of Nijmegen who:

- made a trip in the previous three months to Amsterdam, Rotterdam or The Hague;
- did not use a yearly rail pass, or other types of pass which would eliminate the marginal cost of the trip;
- had the possibility of using a car, namely, possessed a driver's license and had a car available in the household; and
- had the possibility of using rail, namely, did not have any very heavy baggage, were not handicapped, and did not need to visit multiple destinations.

Qualifying residents of Nijmegen were identified in a random telephone survey and requested to participate in a home interview. 235 interviews were conducted out of the 365 people who were reached by telephone and satisfied the above criteria. The entire home interview was administered using laptop microcomputers, so the respondents replied to the questions on the computer screen. The respondents were requested to report the characteristics of the above-mentioned trip, and those of a trip to the same destination but with the unchosen mode. So the attribute values of both modes were provided by the respondents rather than calculated from network data. The data have 228 observations (some observations had to be discarded because of inconsistency), each including the following items:

- mode used (rail or car)
- trip purpose

- travel cost (for both chosen mode and unchosen mode)
- in-vehicle travel time (for both chosen mode and unchosen mode)
- access and egress time (for both chosen mode and unchosen mode)
- number of transfers for rail mode
- socio-economic characteristics of the respondent (e.g., age, gender)

Variables and Descriptive Statistics

In addition to the 228 RP observations, all individuals (except two) provided up to nine stated preference (SP) responses to hypothetical changes in network attributes. There is a total of 1739 RP and SP observations available. The variables in this dataset are summarized in Tables 1, 2 and 3 (if the type of data is not specified, it means that the variable appears in both RP and SP).

Name	Description	Data
id	Unique numerical identifier for each subject	
rp	1 if the record is an RP choice, 0 otherwise	
sp	1 if the record is an SP choice, 0 otherwise (note: rp + sp = 1)	
choice	Mode choice (and setting) indicator: 0 for auto in RP context, 1 for rail in RP context, 10 for auto in SP context, 11 for rail in SP context	
rp_choice	Mode choice indicator for the person's actual choice: 0 for auto, 1 for rail (note: rp_choice = choice for RP records)	
rail_ivtt	in-vehicle travel time for rail (hours)	
rail_cost	Cost (per person) for rail (Guilders)	
rail_transfers	Number of transfers for rail	
rp_transfer	Number of rail transfers in the RP choice (note: rail_transfers = rp_transfer for RP records)	RP
rail_comfort	Comfort level for rail in the SP exercises: 0 = least comfortable, 1 = medium comfort, 2 = most comfortable; -1 for RP records	SP

Table 1: Description of variables

Name	Description	Data
rp_rail_ovt	Access plus egress time for rail (hours) in the RP choice	RP
rail_acc_mode	Walk access dummy for rail in the RP choice: 1 = respondent walked to station, 0 = other access mode; -1 for SP records	RP
rail_egr_mode	Walk egress dummy for rail in the RP choice: 1 = respondent walked from station, 0 = other egress mode; -1 for SP records	RP
seat_status	First class dummy for rail in the RP choice: 1 = respondent traveled in first class, 0 = other class(es); -1 for SP records	RP
car_ivtt	in-vehicle time for auto (hours)	
car_cost	Cost (per person) for auto (Guilders)	
rp_car_ovt	Out-of-vehicle time (hours) for auto in the RP choice	RP
car_parking_fee	Free parking dummy for auto in the RP choice: 1 = traveler can park for free, 0 = traveler must pay for parking; -1 for SP records	RP
purpose	Business trip dummy: 1 = business trip 0 = other purposes	
rail_acc_time	Rail access time (hours)	
rail_egr_time	Rail egress time (hours)	
car_walk_time	Walking time parking/destination path (hours)	

Table 2: Description of variables

Name	Description
arrival_time	Fixed arrival time dummy: 1 = traveler must arrive at a given time, 0 = traveler has flexibility in arrival time
gender	Gender dummy: 1 = female, 0 = male
npersons	Number of persons traveling together
age	Age dummy: 1 = 41 or older, 0 = 40 or younger
employ_status	Unemployment dummy: 1 = unemployed, 0 = employed
mainearn	Main earner dummy: 1 = main earner in the family, 0 otherwise

Table 3: Description of variables

Note that even though the out-of-vehicle times are obtained from the RP survey, the same values can be used for SP because in the SP survey, respondents referred to the trip they reported in the RP survey, and so they would have considered out-of-vehicle time in evaluating the hypothetical alternatives.

In Table 4, we show the descriptive statistics for some of the variables. Note that for RP specific attributes, the descriptive statistics in Table 4 only concern a subsample of the observations.

	Mean	Std. Dev.	Minimum	Maximum
choice (RP)	0.36	0.48	0	1
choice (SP)	10.27	0.44	10	11
npersons	2.46	1.30	1	6
car_ivtt	1.71	0.38	0.75	3.05
car_cost	16.52	15.74	0.25	112.5
rail_ivtt	2.00	0.49	0.75	4.17
rail_cost	31.09	11.79	5.45	93.75
purpose	0.16	0.37	0	1
rail_transfers	0.57	0.68	0	3
gender	0.45	0.50	0	1
age	0.33	0.47	0	1
employ_status	0.49	0.50	0	1
mainearn	0.48	0.50	0	1
arrival_time	0.39	0.49	0	1
rail_acc_mode	0.25	0.43	0	1
rail_egr_mode	0.26	0.44	0	1
seat_status	0.07	0.26	0	1
car_parking_fee	0.65	0.48	0	1
rail_comfort	0.74	0.64	0	2
rp_rail_ovt	0.55	0.25	0.08	1.50
rp_car_ovt	0.09	0.11	0	0.83

Table 4: Descriptive statistics