Swissmetro Case

This data set consists of survey data collected on the trains between St. Gallen and Geneva, Switzerland, during March 1998. The respondents provided information in order to analyse the impact of the modal innovation in transportation, represented by the Swissmetro, a revolutionary mag-lev underground system, against the usual transport modes represented by car and train.

Context

Innovation in the market for intercity passenger transportation is a difficult enterprise, as the existing modes: private car, coach, rail as well as regional and long-distance air services continue to innovate in their own right by offering new combinations of speeds, services, prices and technologies. Consider for example high-speed rail links between the major centres or direct regional jet services between smaller centres. The Swissmetro SA in Geneva is promoting such an innovation: a mag-lev underground system operating at speeds up to 500 km/h in partial vacuum connecting the major Swiss conurbations, in particular along the Mittelland corridor (St. Gallen, Zurich, Bern, Lausanne and Geneva).

Data Collection

The Swissmetro is a true innovation. It is therefore not appropriate to base forecasts of its impact on observations of existing revealed preferences (RP) data. It is necessary to obtain data from surveys of hypothetical markets/situations, which include the innovation, to assess the impact. Survey data was collected on rail-based travels, interviewing 470 respondents. Due to data problems, only 441 are used here. Nine stated choice situations were generated for each of 441 respondents, offering three alternatives: rail, Swissmetro and car (only for car owners).

A similar method for relevant car trips with a household or telephone survey was deemed impractical. The sample was therefore constructed using licence plate observations on the motorways in the corridor by means of video recorders. A total of 10529 relevant licence plates were recorded during September 1997. The central Swiss car licence agency had agreed to sending up to 10000 owners of these cars a survey-pack. Until April 1998, 9658 letters were mailed, of which 1758 were returned. A total of 1070 persons filled in the survey completely and was willing to participate in the second SP survey, which was generated using the same approach which had been used for the rail interviews. 750 usable SP surveys were returned.

Variables and Descriptive Statistics

The descriptive statistics of the dataset are summarized in table 1 while the variables are described in tables 2 and 3.

A more detailed description of the data set as well as the data collection procedure is given in ?.

name	N	range	min	max	mean	std
ID	10728	1191	1	1192	596.5	344.11
SURVEY	10728	1	0	1	.63	.48
SP	10728	0	1	1	1	0
PURPOSE	10728	8.00	1	9	2.91	1.14
FIRST	10728	1.00	0	1	.47	.49
TICKET	10728	9.00	1	10	2.88	2.19
WHO	10728	3.00	0	3	1.49	.70
LUGGAGE	10728	3.00	0	3	.67	.60
AGE	10728	5	1	6	2.89	1.03
MALE	10728	1	0	1	.75	.43
INCOME	10728	4	0	4	2.33	.94
ORIGIN	10728	24	1	25	13.32	10.14
DEST	10728	25	1	26	10.79	9.74
TRAIN_AV	10728	0	1	1	1	0
CAR_AV	10728	1	0	1	.84	.36
SM_AV	10728	0	1	1	1	0
TRAIN_TT	10728	1018	31	1049	166.62	77.35
TRAIN_CO	10728	5036	4	5040	514.33	1088.932
GA	10728	1	0	1	.14	.34
TRAIN_FR	10728	90	30	120	70.10	37.43
SM_TT	10728	788	8	796	87.46	53.55
SM_CO	10728	6714	6	6720	670.34	1441.59
SM_FR	10728	20	10	30	20.02	8.16
SM_SEATS	10728	1	0	1	.11	.32
CAR_TT	10728	1560	0	1560	123.79	88.71
CAR_CO	10728	520	0	520	78.74	55.26
GROUP	10728	1	2	3	2.63	.48
CHOICE	10728	3	0	3	2.15	.63

Table 1: Descriptive statistics

Name	Description
ID	Respondent identifier
SURVEY	Survey performed in train (0) or car (1)
SP	It is fixed to 1 (stated preference survey)
PURPOSE	Travel purpose. 1: Commuter, 2: Shopping, 3: Business, 4: Leisure, 5: Return from work, 6: Return from shopping, 7: Return from business, 8: Return from leisure, 9: other
FIRST	First class traveller (0 = no, 1 = yes)
TICKET	Travel ticket. 0: None, 1: Two way with half price card, 2: One way with half price card, 3: Two way normal price, 4: One way normal price, 5: Half day, 6: Annual season ticket, 7: Annual season ticket Junior or Senior, 8: Free travel after 7pm card, 9: Group ticket, 10: Other
WHO	Who pays (0: unknown, 1: self, 2: employer, 3: half-half)
LUGGAGE	Dummy to capture if the traveller carries luggage or not.
AGE	It captures the age class of individuals. The age-class coding scheme is of the type: 1 if age$\leq$24, 2 if age$\leq$24, 3 if age$\leq$39, 4 if age $\leq$ 54, 5 if age $\leq$ 65, 6 if age $>$ 65
MALE	Traveller's Gender 0: female, 1: male
INCOME	Traveller's income per year [thousand CHF] 1: $\leq$ 50, 2: $\leq$ 100, 3: $>$ 100
ORIGIN	Travel origin (a number corresponding to a Canton)
DEST	Travel destination (a number corresponding to a Canton)
TRAIN_AV	Train availability dummy
CAR_AV	Car availability dummy
SM_AV	SM availability dummy

Table 2: Description of variables

Name	Description
TRAIN_TT	Train travel time. Travel times are door-to-door making assumptions about car-based distances (1.25*crow-flight distance)
TRAIN_CO	Train cost. It is considered equal to zero if the decision-maker has a GA (annual season ticket) to make the distinction between regular and occasional travellers.
GA	Variable capturing the effect of the Swiss annual season ticket for the rail system and most local public transport. It is 1 if the individual owns a GA, zero otherwise.
TRAIN_FR	Train frequency (headway) [minutes] Example: If there are two trains per hour, the value of TRAIN_FR is 30.
SM_TT	SM travel time considering the future Swissmetro speed of 500 km/h
SM_CO	SM cost calculated at the current relevant rail fare including all reductions, multiplied with a fixed factor (1.2) to reflect the higher speed. It is equal to zero if the respondent has a GA.
SM_FR	SM frequency (headway) [minutes] Example: If there are two Swissmetros per hour, the value of SM_FR is 30.
SM_SEATS	Seats configuration in the Swissmetro (dummy). Airline seats (1) or not (0).
CAR_TT	Car travel time
CAR_CO	Car cost considering a fixed average cost per kilometre (1.20 CHF/km)
GROUP	Different groups in the population
CHOICE	Choice indicator. 1: Train, 2: SM, 3: Car

Table 3: Description of variables