Swissmetro

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Context

This dataset consists of survey data collected on the trains between St. Gallen and Geneva, Switzerland, during March 1998. The respondents provided information in order to analyze 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.

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 centers or direct regional jet services between smaller countries. The Swissmetro SA in Geneva promoted 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). A more detailed description of the dataset as well as the data collection procedure is given in Bierlaire et al. (2001).

Data Collection

Since Swissmetro is a true innovation, it is 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 were 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 license plate observations on the motorways in the corridor by means of video recorders. A total of 10529 relevant license plates were recorded during September 1997. The central Swiss car license agency had agreed to send 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 were willing to participate in the second SP survey, which was generated using the same approach used for the rail interviews. 750 usable SP surveys were returned, from the license-plate based survey.

Variables and Descriptive Statistics

The variables of the dataset are described in Tables 1 and 2, and the descriptive statistics are summarized in Table 4. Table 3 includes the coding of the cantons.

Variable	Description
GROUP	Different groups in the population. 2: current rail users, 3: current road users
SURVEY	Equivalent to GROUP but using different coding: 0: train users, 1: car users
SP	It is fixed to 1 (stated preference survey)
ID	Respondent identifier
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 traveler (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	0: none, 1: one piece, 3: several pieces
AGE	It captures the age class of individuals. The age-class coding scheme is of the type: 1: age$\leq$24, 2: 24<age$\leq$39, 3: 39<age$\leq$54, 4: 54<age$\leq$ 65, 5: 65 <age, 6: not known
MALE	Traveler's Gender 0: female, 1: male
INCOME	Traveler's income per year [thousand CHF] 0 or 1: under 50, 2: between 50 and 100, 3: over 100, 4: unknown
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.
ORIGIN	Travel origin (a number corresponding to a Canton, see Table 3)
DEST	Travel destination (a number corresponding to a Canton, see Table 3)
TRAIN_AV	Train availability dummy
CAR_AV	Car availability dummy
SM_AV	SM availability dummy
TRAIN_TT	Train travel time [minutes]. Travel times are door-to-door making assumptions about car-based distances (1.25*crow-flight distance)
TRAIN_CO	Train cost [CHF]. If the traveler has a GA, this cost equals the cost of the annual ticket.
TRAIN_HE	Train headway [minutes] Example: If there are two trains per hour, the value of TRAIN_HE is 30.
SM_TT	SM travel time [minutes] considering the future Swissmetro speed of 500 km/h
SM_CO	SM cost [CHF] calculated at the current relevant rail fare, without considering GA, multiplied by a fixed factor (1.2) to reflect the higher speed.

Table 1: Description of variables

Variable	Description
SM_HE	SM headway [minutes] Example: If there are two Swissmetros per hour, the value of SM_HE is 30.
SM_SEATS	Seats configuration in the Swissmetro (dummy). Airline seats (1) or not (0).
CAR_TT	Car travel time [minutes]
CAR_CO	Car cost [CHF] considering a fixed average cost per kilometer (1.20 CHF/km)
CHOICE	Choice indicator. 0: unknown, 1: Train, 2: SM, 3: Car

Table 2: Description of variables

Number	Canton	Number	Canton	Number	Canton
1	ZH	10	FR	19	AG
2	BE	11	SO	20	TH
3	LU	12	BS	21	TI
4	UR	13	BL	22	VD
5	SZ	14	SH	23	VS
6	OW	15	AR	24	NE
7	NW	16	AI	25	GE
8	GL	17	SG	26	JU
9	ZG	18	GR		

Table 3: Coding of Cantons

Variable	Min	Max	Mean	St. Dev.
GROUP	2	3	2.63	0.48
SURVEY	0	1	0.63	0.48
SP	1	1	1.00	0.00
ID	1	1192	596.50	344.12
PURPOSE	1	9	2.91	1.15
FIRST	0	1	0.47	0.50
TICKET	1	10	2.89	2.19
WHO	0	3	1.49	0.71
LUGGAGE	0	3	0.68	0.60
AGE	1	6	2.90	1.03
MALE	0	1	0.75	0.43
INCOME	0	4	2.33	0.94
GA	0	1	0.14	0.35
ORIGIN	1	25	13.32	10.14
DEST	1	26	10.80	9.75
TRAIN_AV	1	1	1.00	0.00
CAR_AV	0	1	0.84	0.36
SM_AV	1	1	1.00	0.00
TRAIN_TT	31	1049	166.63	77.35
TRAIN_CO	4	5040	514.34	1088.93
TRAIN_HE	30	120	70.10	37.43
SM_TT	8	796	87.47	53.55
SM_CO	6	6720	670.34	1441.59
SM_HE	10	30	20.02	8.16
SM_SEATS	0	1	0.12	0.32
CAR_TT	0	1560	123.80	88.71
CAR_CO	0	520	78.74	55.26
CHOICE	1	3	2.15	0.63

Table 4: Descriptive statistics

References

Bierlaire, M., Axhausen, K. and Abay, G. (2001), The acceptance of modal innovation: The case of Swissmetro, *in* 'Proceedings of the Swiss Transport Research Conference', Ascona, Switzerland.