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Destination choice modelling for different leisure activities

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Background

Leisure is the most important trip purpose

- 40 % of all trips (work: 23 %)
- 44 % of all person kilometres (SA: 62%, SU: 76%)

Leisure traffic is a major contributor to the negative effects of motorised traffic.

Leisure trips are very heterogeneous.

Leisure trips: Little attention in travel modelling practice

Aim

More information about destination choice within Switzerland:

- Influence of natural environment
- Influence of infrastructure facilities
- Influence of distance between origin - destination
- Dependency on leisure purpose

Method I

Choice between destination = Choice between discrete alternatives

➔ Discrete choice models

Assumption: Persons are trying to maximise their utility U.

$$U_{jq} = V_{jq} + \varepsilon_{jq}$$

$$V(X_{kjq}) = \alpha_j + \sum \beta_{k''j}\, p_{k''q} + \sum \beta_{k'j}\, s_{k'q} + \sum \beta_{kj}\, x_{kjq}$$

Method II

The *Multinominal Logit (MNL)* is used.

Assumptions:

- ε_{jq} is independent and identically gumbel distributed (➔ IIA-property).
- Utility function is linear-in parameters.

Probability P:

$$P_{jq} = \frac{e^{V_{jq}}}{\sum_{\forall n} e^{V_{nq}}}$$

Basic model idea

Leisure consists of very different activities which satisfy different desires and are influenced by different impacts.

→ Necessity to concentrate on different types of leisure

Three different activity groups were selected:

- Skiing
- Climbing and hiking
- Walking and swimming

Database

Demand side

KEP (‘Kontinuierliche Erhebung zum Personenverkehr’):

17’000 persons, one week trip diary, trips over 3 km

‘Zusatzmodul Reiseverhalten’:

7’300 persons, excursions within the last two weeks

‘Mikrozensus Verkehr 2000’ (only for skiing model):

29’407 persons, one day trip diary

Database

Supply side

Detailed database at the municipality level (2’900 municipalities)

- demographics
- spatial structure
- leisure infrastructure
- tourism
- economy

Problem: Destinations are sometimes not equal with municipalities.

Choice set

Destination choice - large number of alternatives

→ Necessity to draw a (random) sample of non-chosen alternatives

1 chosen alternative + 9 non-chosen alternatives

Non-chosen alternatives dependent on leisure types:

- Skiing - skiing resorts
- Climbing and hiking - municipalities located over 800 meters
- Walking and swimming - municipalities located below 600 meters, not being a town

Alternative specific variables

Skiing: objective factors, like price level, number of lifts, snow conditions or length of tracks, and a subjective assessment of the quality of the skiing resorts

Climbing and hiking: Area [ha] with different vegetation types, sport facilities, employees in gastronomy facilities

Walking and swimming: Area [ha] with different vegetation types, sport and cultural facilities, employees in gastronomy facilities

Skiing model: t-statistics

	distance incl.	not incl.
Log(distance)	-19	
Mountain area [ha]	7	8
Inh. at destination/inh. at origin	-2	-2
Belonging to the skiing area	5	4
Price for a one week ticket	3	3
Quality of alpine skiing area	-2	-4
Quality of après-ski	6	3
Quality of hiking paths	-3	-3
Employees in boutiques	3	3
Number of indoor pools	6	8
Number of indoor courts	3	4
Number of ice skating facilities	5	5
Log likelihood function (β)	-914	-1'266
R^2	0.45	0.23

Skiing model: Elasticities

	not chosen alternative	chosen alternative
Log(distance)	2.98	-5.15
Mountain area [ha]	-0.19	0.19
Price for a one week ticket	-0.68	0.83
Quality of alpine skiing area	0.36	-0.43
Quality of après-ski	-0.68	0.83
Number of indoor pools	-0.28	0.21

Climbing and hiking model: t-statistics

	distance incl.	not incl.
Log(distance)	-18	
Height of municipality	5	1
Area with open forest [ha]	-2	-4
Area with bushes [ha]	3	3
Area with copses [ha]	5	6
Area without vegetation	2	1
Area with meadows	-4	-7
Hiking paths [km]	2	4
Employees in gastronomy facilities	2	5
Number of baths in lakes	3	3
Number of outdoor pools	4	6
Log likelihood function (β)	-266	-985
R^2	0.80	0.25

Walking and swimming model: t-statistics

	distance incl.	not incl.
Log(distance)	-45	
Number of inhabitants	-4	15
Area with closed forest [ha]	2	1
Area with parks [ha]	7	3
Inh. at destination/inh. at origin	-4	-14
Hiking paths [km]	8	8
Employees in gastronomy facilities	4	-0
Number of cultural facilities	3	2
Number of baths in lakes	10	11
Number of outdoor pools	13	15
Log likelihood function (β)	-1’378	-5’340
R^2	0.81	0.28

Results

General results:

- Decisive importance of distance
- Very low influence of person variables (used in conjunction with generic variables)

Specific results:

- **Skiing -** availability of entertainment and additional sport facilities more important than skiing supply itself
- **Climbing and hiking -** people appreciate a good leisure infrastructure and for Alpine regions typical vegetation types
- **Walking and swimming -** distance very important, infrastructure more important than nature

Interpretation

Main results:

- Importance of distance
- Importance of varied infrastructure

Is this a proof of the necessity for further infrastructural extensions?

No: In this analysis was no place for smaller innovations and niches.

Yes: Competition between destinations is becoming fiercer.

Future developments

Consideration of additional surveys: ‘Mikrozensus 2000’, ‘Reisemarkt’

Consideration of other leisure types, e.g. visiting friends, ...

Weighting of alternatives for the choice set

Other model types:

- Nested Logits - Relaxation of assumption of independence across alternatives
- Nested Logits with mode choice
- RPL (Random Parameters Logits) - Relaxation of assumption of unique parameter values