The Effect of airport parking fees on the tourist's airport / airline choice behavior

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Agenda

- Introduction
- Literature Review in Airport/ Airline Choice Behavior
- Choice Experiment and Data
- Model Specification and Results
- Conclusions

Introduction

- 2 major reasons for the Analysis of Airline/ Airport Choices
  - Airport Competition
  - Airport Regulation
- Main Approach: Substitution between travel time to the airport and cost of flying

Introduction

Main Approach

For individual t: $if \quad U_{it} > U_{jt} \Rightarrow i \succ j, \forall j \in J.$

Probabilistic model: $U_{it} = V_{it} + \varepsilon_{it}$

Assuming iid and extrem valued distributed derives the well known MNL choice probabilities

$$P(i) = \frac{e^{V_i}}{\sum_j e^{V_j}}$$

Introduction

Additional modeling approaches:

- Nested Logit: Grouping alternatives
- Mixed Logit: a flexible parametric form; allows for flexible substitution patterns; relaxes the assumption of independently distributed error terms:

Two different specifications of mixed logit

a) Random coefficient model

$$p_{i,t} = \int \left(\frac{e^{V_{i,t}}}{\sum_{i`} e^{V_{i,t}}} \right) f(\beta|\omega)\, d\beta$$

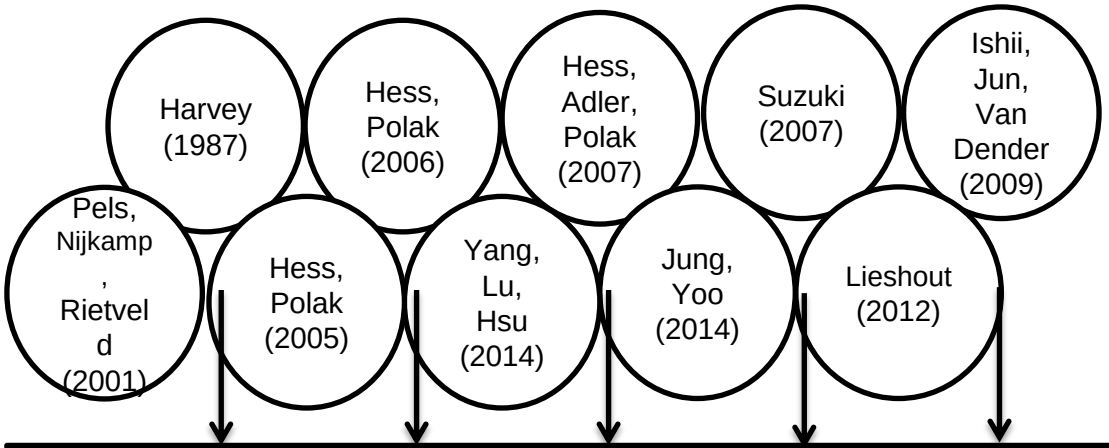
b) Error component model

Both are equivalent (Train, 2009)

Literature Review

Two Findings:

- Mainly: MNL and NL Specifications
- No consideration of parking charges



Main results

- Main variables: access time, flight cost, flight frequency, departure time, direct flight, inertia
- Business travelers more time sensitive
- Leisure travelers more cost sensitive

Choice Experiment and Data

- Stated choice experiment
- Flying for touristic reasons
- Multiairport area: Berlin/ Leipzig / Dresden
- 600 observations
- Sociodemogr. Data
- Distance to the airport: Zip Code
- Orthogonal Design
- All other attributes affecting choices: Identical

Attribute	Levels
Alternatives	Leipzig/Condor, Dresden/Germania, Dresden/Air Berlin, Berlin-Schönefeld/Condor, Berlin-Schönefeld/Easyjet
Flight cost	210-500 Euro
Parking cost	25-115 Euro
Direct flight	Yes, No
Mile bonus	200-4000 Miles
Parking period	7 or 14 days

Model Specifications

- random coefficients model:

- $U_{ni} = V_{ni}^{*} + \varepsilon_{ni} = \beta' x_{ni} + \varepsilon_{ni}$

- Deterministic part:

- $V_{ni}^{*} = ASC_i + \boldsymbol{\beta_{RANDOM_{Distance}}} * Distance_{ni} + \beta_{Cost} * Cost + \beta_{Parking} * Parking_{ni} + \beta_{Direct\ flight} * Direct\ flight_{ni} + \beta_{Miles} * Miles_{ni} + \beta_{Duration} * Duration_{ni} + \beta_{i,Age} * Age_n + \beta_{i,Sex} * Sex_n + \beta_{i,Income} * Income_n + \beta_{i,Occupation} * Occupation_n + \beta_{i,Education} * Education_n$

- Test of normal- and Lognormal distribution

Model Specifications

- Error component model (similar to panel data models in regression analysis)

  One additional error component per airport alternative

- $U_{nid} = V_{nid} + \varepsilon_{nid} + EC_{ni}$

- Deterministic part:

- $V_{nid} = ASC_i + \beta_{Distance} * Distance_{nid} + \beta_{Cost} * Cost_{nid} + \beta_{Parking} * Parking_{nid} + \beta_{Direct\ flight} * Direct\ flight_{nid} + \beta_{Miles} * Miles_{nid} + \beta_{Duration} * Duration_{nid} + \beta_{i,Age} * Age_{nd} + \beta_{i,Sex} * Sex_{nd} + \beta_{i,Income} * Income_{nd} + \beta_{i,Occupation} * Occupation_{nd} + \beta_{Education} * Education_{nd}$

- Additional error component:

- $EC_{ni} = \sigma_{ni} * Random\ variable_{ni}$

Results

- **Random Coefficients Model– selected results**

- Normal and Lognormal distributions lead to very similar results

- $$\beta_{Distanz\_Random} \sim N(-0.0209, 0.0114^2)$$

- $$\ln(\beta)_{Distanz\_Random} \sim N(-0.0209, 0.0109^2)$$

- - 96% of the values with negative sign

Results

	Random Coefficient	Error Component
Null Log-Likelihood	-659.167	-659.167
Final Log-Likelihood	-389.205	-371.426
LR Test	539.924	575.484
Pseudo-R^2	0.410	0.437

Variable	**Parameter**	**Parameter**
Flight cost	-0.0312***	-0.0352***
Direct flight	2.64***	2.79***
Parking fees	-0.0322***	-0.0349***
Distance to airport	-0.0228***	-0.0241***
Distance_standard dev.	0.0110***	
Error Component Dresden		0.858***
Error Component Berlin		1.90***

Results

	Random Coefficient	Error Component
VTTS	73.00 Euro/h	68 Euro/h
WTP for a direct flight	84.62 Euro	79.26 Euro
Elasticities: $E_{X_{ikn}}^{P_{in}} = -\beta_{ik} * X_{ikn} * (1 - P_{in})$ Example for Alternative Dresden/Air Berlin		
Distance	-1.06	-1.10
Flight cost	-6.06	-8.41
Parking fees	-1.46	-1.58
Direct flight (Marginal Effect)	-1.769	-1.874

Conclusions

- **Summary**

- Decision relevant alternative attributes:
- → distance (-), → flight cost (-),
- → parking fees(-),→ direct flight (+)
- Heterogeneity in preferences
- Error Component Model performs best
- Holiday travelers are strongly cost sensitive

Parts of these results are confirmed in literature (in particular Hess/Polak, 2009)

Conclusions

Additional dimensions

Airline Revenue Management should take into account

a) The individual valuation of Point-to-point vs. via connections

b) VTTS, in particular in multiairport areas

Management of parking spaces at airports should take into account the parking price elasticity

Thank you for attention