

# Low-cost airlines and airport competition

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## Introduction

- Advent of low cost airlines has been one of the most striking developments in the air transport industry in Europe since its liberalisation in the 1980s and 1990s.
- To which extent present low-cost airlines operating from secondary airports in a multiple airport region an effective competitive constraint on pricing of traditional full-service airlines serving main airports?

## Introduction 2

- Various issues:
  - Competition between airports?
    - Secondary airports
    - Airport capacity
  - Passenger heterogeneity: to what extent do passengers really value flexibility offered by full-service carriers?
    - Competition for 'old' airports and carriers, or new markets?

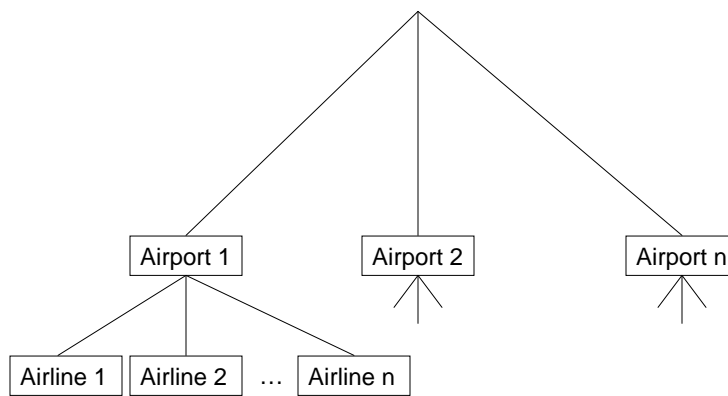
## Introduction (3)

- In this paper we analyze passenger preferences concerning airports and airlines:
  - What are the price elasticities of choice probabilities?
  - What are the effects of a price change by a low-cost carrier on the probability that other airport-airline combinations are chosen?

## Model

- Nested logit model is used (Hess, Furuichi and Koppelman, Bondzio, Ashford and Benchemam, Brooke et al., Hansen, Harvey)
- Frequency and airport accessibility usually included (business travelers more sensitive).
- Fare not so often included:
  - lack of information (quality)
  - “variability on a flight exceeds variability between flights”

## Model 2



Choice structure

## Model 3

$$P(l/d) = \frac{\exp\left(\frac{V_l}{\mu}\right)}{\sum_r \exp\left(\frac{V_r}{\mu}\right)}$$

$V_l$  is a function of  $\ln(\text{frequency})$  and fare

$$P(d) = \frac{\exp\left(V_d + \mu \ln \sum_l \exp\left(\frac{V_l}{\mu}\right)\right)}{\sum_{d'} \exp\left(V_{d'} + \mu \ln \sum_l \exp\left(\frac{V_l}{\mu}\right)\right)}$$

$V_d$  is a function of airport accessibility

## Model 4

European routes offered at five London airports, July 2005

	<i>One airport</i>	<i>Two airports</i>	<i>Three or more airports</i>	<i>Total</i>
Routes	82	32	50	164
	50%	20%	30%	100%
Flights	8,992	9,397	48,446	66,835
	13%	14%	72%	100%

## Model 5

Route availability by airport

	<i>Only from this airport</i>	<i>At least from one other airport</i>	<i>Total</i>
Heathrow	6	57	63
	10%	90%	100%
Gatwick	15	59	74
	20%	80%	100%
Luton	7	40	47
	15%	85%	100%
Stansted	49	67	116
	42%	58%	100%
City	5	17	22
	23%	77%	100%

## Data

- CAA-survey; Januari 2003-March 2004
  - 9-1-2003 - 31-3-2003: period 1 (nov02)
  - 1-4-2003 - 31-10-2003: period 2 (jun03)
- Airports: BHX, BRS, EMA, LCY, LGW, LHR, LTN, STN
- OAG-records: frequency of service (limited information: Nov 2002, June 2003, Nov 2003).

## Data 2

	<i>Legacy</i>	<i>Ryanair</i>	<i>easyJet</i>	<b>total</b>
LCY	733	0	0	733
LGW	978	105	428	1511
LHR	3524	0	0	3524
LTN	112	79	855	1046
STN	57	730	0	787
<b>Total</b>	5404	914	1283	7604

*Number of respondents, Period 1*

## Data 3

	<i>Period 1</i>		<i>Period 2</i>	
	<i>Business</i>	<i>Leisure</i>	<i>Business</i>	<i>Leisure</i>
BHX			29.4%	70.6%
BRS			20.9%	79.1%
EMA			20.9%	79.1%
LCY	46.4%	53.6%	33.6%	66.4%
LGW	31.2%	68.8%	28.0%	72.0%
LHR	41.5%	58.5%	36.3%	63.7%
LTN	17.7%	82.3%	19.7%	80.3%
STN	12.7%	87.3%	9.2%	90.8%
<b>Total</b>	33.7%	66.3%	26.4%	73.6%

*Shares of business and leisure passengers*

## Data 4

	<i>Period 1</i>		<i>Period 2</i>	
	<i>Business</i>	<i>Leisure</i>	<i>Business</i>	<i>Leisure</i>
Business/club	22.2%	4.5%	16.5%	3.3%
Economy (flexible)	15.1%	5.2%	15.4%	4.2%
Economy (other)	61.3%	85.6%	65.2%	86.1%
FFP	0.2%	2.2%	0.2%	1.5%
Other	1.2%	2.5%	2.7%	4.9%
<b>Total</b>	100%	100%	100%	100%

*Shares of business and leisure passengers and ticket types*

## Data 5

	<i>Business/club</i>	<i>Economy flexible</i>	<i>Economy Other</i>
Air France	21.52%	25.14%	53.28%
Alitalia	34.45%	7.03%	58.36%
British Airways	29.62%	17.02%	53.36%
British Midland	22.98%	14.67%	62.31%
Aer Lingus	18.41%	13.94%	67.62%
KLM	16.97%	26.65%	56.36%
Lufthansa	31.47%	14.81%	53.68%
Ryanair	-	0.81%	99.16%
easyJet	0.01%	0.98%	98.99%

*Contribution of tickets in total revenues; based on average prices per class in sample.*

## Data 6

	<i>November 2002</i>		<i>June 2003</i>	
	<i>Business</i>	<i>Leisure</i>	<i>Business</i>	<i>Leisure</i>
legacy	40.5%	59.5%	32.3%	67.7%
Ryanair	12.6%	87.4%	10.3%	89.7%
easyJet	19.9%	80.1%	16.9%	83.1%

*Shares of business and leisure passengers per carrier type*

## Data 7

	<i>Period 1</i>		<i>Period 2</i>	
	<i>Business</i>	<i>Leisure</i>	<i>Business</i>	<i>Leisure</i>
legacy	85.5%	63.8%	81.4%	61.1%
Ryanair	4.5%	15.8%	4.6%	14.3%
easyJet	10.0%	20.4%	14.0%	24.6%
total	100%	100%	100%	100%

*Market shares of carriers*

		<i>parameter estimate</i>	<i>standard error</i>
<i>airline choice variables</i>	ln(frequency)	1.15885	0.23398
	fare	-0.00272	0.00167
<i>airport choice variables</i>	LCY	1.87374	0.91387
	LGW	2.15382	0.27731
	LHR	1.87415	0.49822
	LTN	1.65507	0.51902
	STN	2.06133	0.45675
	road distance	-0.0211	0.00379
<i>inclusive value parameters</i>	$\mu_{LCY}$	0.76756	0.11128
	$\mu_{LGW}$	0.76756	0.11128
	$\mu_{LHR}$	0.76756	0.11128
	$\mu_{LTN}$	0.76756	0.11128
	$\mu_{STN}$	0.76756	0.11128
Observations	794		
R <sup>2</sup> -adjusted	0.57		
<i>Estimation results, business passengers, period 1</i>			

		<i>parameter estimate</i>	<i>standard error</i>
<i>airline choice variables</i>	ln(frequency)	0.89159	0.10350
	fare	-0.00232	0.00132
<i>airport choice variables</i>	LCY	-1.65079	1.03984
	LGW	0.94715	0.32591
	LHR	0.39833	0.24076
	LTN	-0.65384	0.24011
	STN	-0.93458	0.39939
	road distance	-0.00678	0.00020
<i>inclusive value parameters</i>	$\mu_{LCY}$	0.64123	0.09920
	$\mu_{LGW}$	0.68402	0.07714
	$\mu_{LHR}$	0.69151	0.06620
	$\mu_{LTN}$	0.97320	0.09939
	$\mu_{STN}$	1	-
	<i>observations</i>	1983	
	<i>R<sup>2</sup>-adjusted</i>	0.57	
<i>Estimation results, leisure passengers, period 1</i>			

airport	9-1-2003 - 31-3-2003						1-4-2003 - 31-10-2003					
	Business			Leisure			Business			Leisure		
	Efare	Efreq	Edist	Efare	Efreq	Edist	Efare	Efreq	Edist	Efare	Efreq	Edist
BHX	.	.	.	.	.	.	-0.22	0.23	-0.41	-0.4	0.4	-0.17
BRS	.	.	.	.	.	.	-0.11	0.18	-0.19	-0.3	0.43	-0.25
EMA	.	.	.	.	.	.	-0.06	0.16	-0.24	-0.3	0.48	-0.23
LCY	-0.29	0.64	-0.54	-0.2	0.52	-0.57	-0.25	0.24	-0.47	-0.2	0.16	-0.05
LGW	-0.16	0.58	-0.58	-0.1	0.53	-0.55	-0.19	0.28	-0.73	-0.4	0.39	-0.17
LHR	-0.33	0.71	-0.41	-0.2	0.51	-0.35	-0.36	0.32	-0.48	-0.5	0.44	-0.08
LTN	-0.08	0.56	-0.91	-0.1	0.59	-1.14	-0.12	0.25	-0.85	-0.2	0.32	-0.17
STN	-0.06	0.44	-0.73	-0	0.13	-0.28	-0.15	0.33	-1.39	-0.1	0.13	-0.07

*fare and frequency elasticity of probability of choice*

Average fare				
	Winter 02		Summer 03	
	leisure	business	leisure	business
BHX			133.75	184.69
BRS			111.13	130.18
EMA			93.83	86.99
LCY	160.97	241.38	148.31	223.4
LGW	96.29	138.57	129.37	168.23
LHR	150.47	230.75	166.94	252.63
LTN	80.47	64.4	103.54	88.17
STN	64.86	60.3	89.22	87.48

*Average fares*

So, an increase in the average BA-fare from LCY of 16 pounds leads to a decrease market share for BA/LCY from 50% to 48.55%.

		Business nov02			Leisure nov02					Business jun03			Leisure jun03		
		Efare	Efreq	N	Efare	Efreq	N			Efare	Efreq	N	Efare	Efreq	N
LCY	EI	0.0111	-0.0661	12	0.0115	-0.0688	56	BHX	EI	0.0003	-0.0009	11	0.0095	-0.0217	68
LHR	BD	0.0091	-0.0619	14	0.01	-0.0609	57	BRS	BA	0.0002	-0.0005	12	0.0114	-0.0258	7
LHR	EI	0.0086	-0.0564	26	0.0104	-0.0642	75	EMA	W	0.0001	-0.0004	30	0.0094	-0.0214	85
LTN	FR	0.0033	-0.023	6	0.0076	-0.047	35	LCY	EI	0.0093	-0.0274	19	0.0102	-0.0233	180
STN	FR	0.0043	-0.0293	13	0.0118	-0.0735	56	LHR	BD	0.0095	-0.028	24	0.01	-0.0227	78
								LHR	EI	0.0085	-0.0252	51	0.01	-0.0227	138
								BHX	FR	0.0002	-0.0006	13	0.0097	-0.0221	62
								BRS	FR	0.0003	-0.0008	27	0.0113	-0.0256	85
								LTN	FR	0.0032	-0.0095	26	0.0095	-0.0215	94
								STN	FR	0.0064	-0.0188	18	0.0106	-0.0241	105

*Cross-elasticities: Effect of by RYANAIR/GATWICK in the market to Dublin:*

*If Ryanair decreases its fare with 6.5 pounds (10%), the market share of Aer Lingus operating from London City decreases with 0.093%.*

*The decrease in the number of passengers is 0.093\*probability that the alternative is chosen\*number of passengers in the market*

## Conclusion

- 50% of European routes (87% of flights) offered from 2 or more London airports.
- Heathrow has most competitors.
- Direct frequency and fare elasticities seem to be in line with values found in literature (but ...)
- Cross-elasticities seem to be small
  - Competitive constraint imposed by low-cost carriers on full-service carriers not so large?