Targeting leisure and business passengers with unsegmented pricing

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Main issues

- Routes having a varying mix of leisure and business travellers
- Under unsegmented pricing, we study how Ryanair adjusts the two main components governing the dynamics of posted fares, namely
  - **time component** (the number of days before departure) and
  - **capacity component** (the current number of available seats).

Literature review

- Alderighi M, Nicolini M, Piga CA. 2014
- Borenstein S, Netz N. 1999
- Dana J. 1999a., 1999b
- Malighetti P, Paleari S, Redondi R. 2009
- McGill J, van Ryzin G. 1999.
- Salanti A, Malighetti P, Redondi R. 2012
- Teichert T, Shehu E, von Wartburg I. 2008
- Thornhill S, White RE. 2007

Unsegmented pricing

- Ryanair’s fare structure is simpler than that adopted by FSCs, an aspect that by itself supports the view of a necessary coordination between a firm’s higher-level strategy and its pricing system: up until mid-2014,

- It adopted **only one reservation class**, and consequently, **one single fare** which is intended for all customers.

Results

- **In routes with a strong presence of leisure** (business) **travellers**, fares are set to be **less** (more) **responsive to the time component;**

- **In schedules more suitable for leisure** (business) **travellers**, fares are set to be **less** (more) **responsive to the capacity component.**

Customer heterogeneity

- Leisure and business travellers differ along two dimensions. First, business travellers usually assign a greater value to a flight and therefore their demand is more price inelastic than that of leisure travellers.
- Second, business travellers tend to plan less in advance than leisure ones (Talluri and van Ryzin, 2004).
- Therefore, heterogeneity between the two traveller segments allows to inter-temporally segment the market, applying higher fares to clients arriving late, mostly business travellers; and cheaper fares to those arriving early, mostly leisure travellers (Desiraju and Shugan, 1999; Courty, 2003; Netessine, 2006).

- When the share of business travellers is high (i.e., on a business route), the carrier will therefore tend to choose a pricing profile with large price hikes in the proximity of the departure date.

- **On business routes, fares tend to be more strongly affected by the time component of RM**.

- **On leisure routes, fares tend to be less strongly affected by the time component of RM**.

Hypothesis 1: lei/biz routes

Product heterogeneity

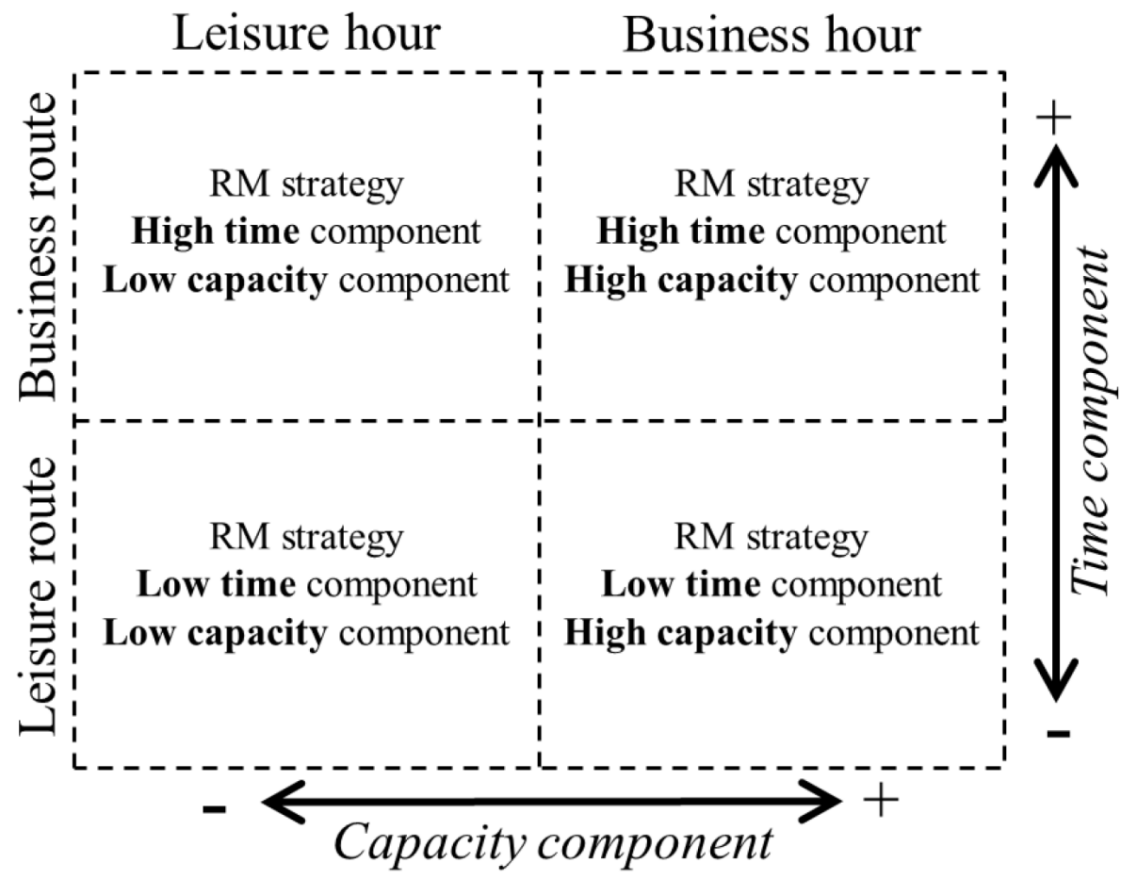
- Flights early in the morning (6am-10am) or late in the evening (6pm-10pm) in the week days (i.e. in a business time) are appealing for business travellers (Borenstein and Netz, 1999).
- Indeed, they allow to easily visit a destination within a working day, i.e., departure in the morning with the return scheduled in the evening.
- Leisure travellers usually prefer a more comfortable schedule and generally have more flexible preferences in terms of departure date and time.

Hypothesis 2: lei/biz hour

- Because the wide majority of LCCs' customers travel for leisure purposes, the carrier faces the problem of inducing leisure travellers to choose flights operated during business hours.

- **In leisure hour flights, the capacity component tends to be less prominent.**

- **In business hour flights, the capacity component tends to be more prominent.**



Hypothesis 3:
lei/biz route + lei/biz hour

Data

- Primary data on repeated **prices for single flights** and **seat availability** were retrieved directly from Ryanair's website using a web crawler, i.e., a programme that automatically launches the online queries necessary to book a flight to a given destination.
- Secondary data detailing the **composition of a route's passengers by reason of travel** (leisure vs. business) were obtained from the International Passenger Survey (henceforth, IPS), a quarterly survey collected by the UK Office of National Statistics.

Step 1. Issue a query for 50 seats for a specific flight. The flight is due to depart D days from the date of the query, where D assumes the following values: 1, 4, 7, 10, 14, 21, 28, 35, 42, 49, 56, 63 and 70. The variable containing the information on the days to departure is labelled *BookingDay* in the subsequent analysis.

Step 2. If the airline's site returns a valid fare, this can be interpreted as follows: "D booking days prior to departure, there are at least 50 seats available on the flight". In this case we can not retrieve any more precise information regarding the observed number of available seats, which is thus censored at the level of 50. We store this information in a variable labelled *AvailableSeats*, which in this case assumes the value of 50. We also retain the corresponding value of the fare posted for the query of 50 seats, which we label *TopFare*. Additionally, we collect the information on the fare for a single seat, which is saved in the *Fare* variable. Finally, we store the value of *BookingDay* and all the other flight's details (see below).

Step 3. If the site fails to return a valid fare for that flight, the web crawler infers that there are fewer than 50 seats available. It then searches the highest number of seats in a query that returns a valid fare. This value defines the number of seats available D days before a flight's departure; it is stored in *AvailableSeats*. In this case, *TopFare* corresponds to the unit price at which the airline was willing to sell all the remaining seats in a single transaction. As in the previous case, we also store the fare for a single seat in *Fare*.

Prices and seat availability

		Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)
(1)	Fare	65.57	42.91						
(2)	AvailableSeats	26.21	13.62	-0.60***					
(3)	BookingDay	11.01	11.09	-0.18***	0.33***				
(4)	BusinessRoute	0.48	0.50	-0.12***	-0.02***	-0.09***			
(5)	BusinessHour	0.35	0.48	-0.06***	0.03***	-0.04***	-0.04***		
(6)	BookOnHolidays	0.22	0.42	0.04***	0.02***	-0.01	-0.01**	-0.01**	
(7)	LagMeanSlope	3.05	2.63	0.05***	-0.22***	-0.22***	0.02***	-0.01***	0.000

Data: mean, S.D. and correlation matrix

Data: mean fare

		AvailableSeats							
		1-9	10-19	20-29	30-39	40-49	≥50	1-49	Total
Route type	Business	116.7	74.0	53.0	40.5	33.8	16.6	60.1	27.0
	Leisure	123.9	86.5	65.3	52.7	44.6	23.8	70.5	35.8
Hour type	Business	119.4	79.4	56.7	44.7	35.7	16.0	62.3	25.7
	Leisure	121.0	80.8	60.9	48.3	41.9	23.5	67.4	35.5
Route/hour type	Biz/Biz	120.2	74.3	50.3	38.2	31.5	13.7	60.1	22.8
	Lei/Biz	118.6	84.4	61.7	49.2	38.7	18.3	64.4	28.6
	Biz/Lei	114.8	73.9	54.2	41.6	35.0	18.8	60.1	29.9
	Lei/Lei	126.3	87.6	67.5	55.0	48.6	28.2	74.3	41.1

		Booking Day										
All seats		1	4	7	10	14	21	28	35	42	49-70	Total
Route type	Business	81.8	55.0	36.9	31.8	22.5	19.4	17.1	16.2	15.2	14.5	27.0
	Leisure	92.0	63.2	47.6	42.9	33.6	29.6	27.0	25.5	24.4	23.8	35.8
Hour type	Business	79.8	54.6	36.7	32.4	22.5	18.8	16.8	15.5	14.5	13.9	25.7
	Leisure	91.4	61.9	45.9	40.6	32.0	28.9	26.0	25.0	23.8	23.3	35.5
Route/hour type	Biz/Biz	76.3	52.0	33.1	28.1	18.3	15.2	13.3	12.3	11.7	11.1	22.8
	Lei/Biz	83.3	57.2	40.3	36.7	26.6	22.1	20.0	18.5	17.1	16.5	28.6
	Biz/Lei	85.2	56.9	39.4	34.3	25.4	22.5	19.8	18.9	17.7	16.9	29.9
	Lei/Lei	98.3	67.5	52.9	47.3	38.9	35.2	32.2	30.7	29.6	29.1	41.1
		Booking Day										
Seats<50		1	4	7	10	14	21	28	35	42	49-70	Total
Route type	Business	94.2	69.0	53.4	47.1	39.7	39.5	41.8	50.5	55.5	66.6	60.1
	Leisure	101.8	76.1	64.9	60.4	55.4	57.4	61.1	61.7	66.7	77.1	70.5
Hour type	Business	95.1	71.9	56.7	51.0	44.2	44.1	48.5	49.4	52.1	56.0	62.3
	Leisure	99.5	72.9	60.8	55.7	50.3	52.3	55.0	61.1	67.1	80.6	67.4
Route/hour type	Biz/Biz	94.8	71.6	54.3	46.5	38.2	36.9	41.0	48.6	58.5	60.6	60.1
	Lei/Biz	95.4	72.2	58.7	54.7	49.1	49.4	53.2	49.9	49.1	53.1	64.1
	Biz/Lei	93.9	67.8	53.0	47.3	40.6	40.8	42.1	51.3	54.4	69.8	60.1
	Lei/Lei	105.7	78.5	68.7	64.0	59.2	61.8	65.2	66.9	73.5	84.5	74.3

Data: mean fare

Estimation issues

- We aim at estimating the following equation:

$$LnFare = \alpha_0 + \alpha_1 AvailableSeats + \alpha_2 BookingDay + \alpha_3 MonthOfBooking + u, \quad (1)$$

- Censored data: bias correction
- Omitted variable problem: IV variables
  - Book on holidays
  - Lag mean slope

Estimation technique

- We follow the procedure 17.4 inWooldridge (2002), as applied in Alderighi et al. (2014):

$$LnFare = \alpha_0 + \alpha_1\, AvailableSeats + \alpha_2\, BookingDay + \alpha_3\, MonthOfBooking + u, \qquad (1)$$

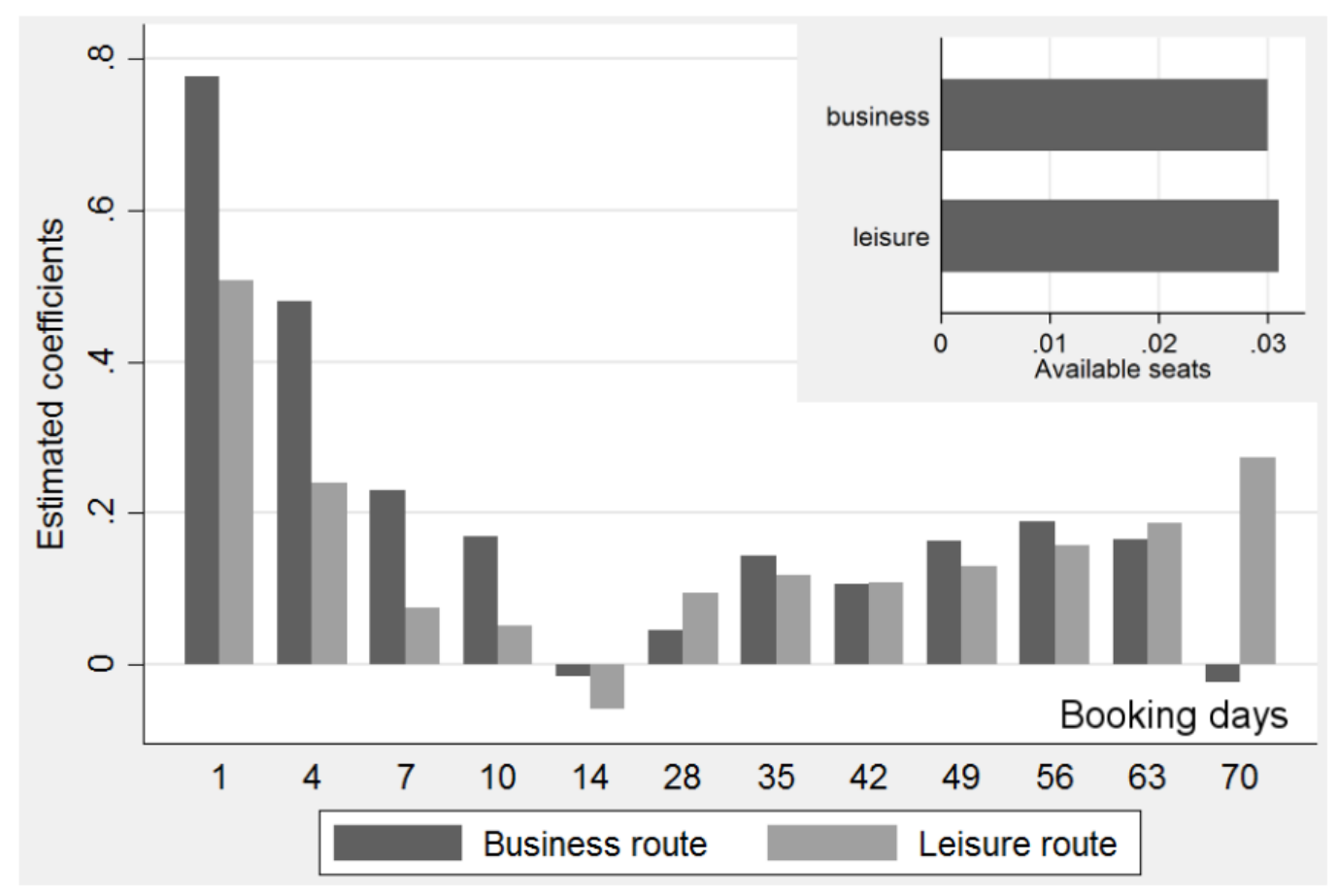
1. We estimate a Tobit specification pooling all observations:
$$AvailableSeats = \beta_0 + \beta_1\, BookingDay + \beta_2\, LagMeanSlope + \gamma\, \mathbf{X} + v,$$

2. We retrieve the residuals $\hat{v}$ for the selected sub-sample.

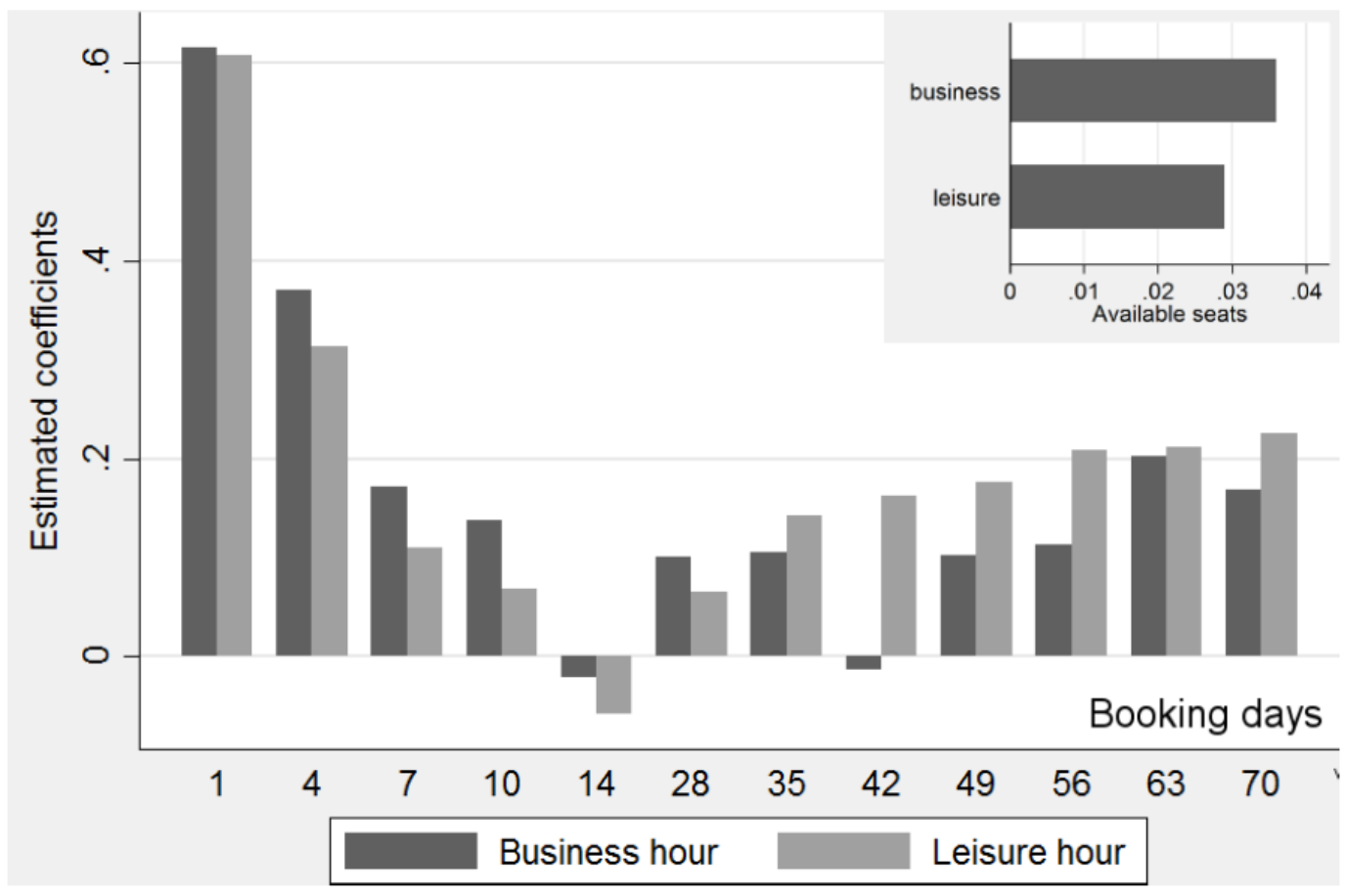
3. On the selected sub-sample, we estimate a modified version of (1), where we include $\hat{v}$ among the regressors to correct for sample selection. As *AvailableSeats* is endogenous, we adopt an Instrumental Variable Two-Stage Fixed Effect (IVFE) estimator, using as instruments *HolidayPeriod* and *LagMeanSlope*.

H1: biz/lei routes

	Route type			
	Business		Leisure	
AvailableSeats	-0.030***	(0.001)	-0.031***	(0.001)
BookingDay1	0.777***	(0.047)	0.507***	(0.036)
BookingDay4	0.479***	(0.040)	0.240***	(0.033)
BookingDay7	0.230***	(0.034)	0.075***	(0.028)
BookingDay10	0.169***	(0.029)	0.051**	(0.023)
BookingDay14	-0.015	(0.024)	-0.059***	(0.019)
BookingDay28	0.046*	(0.025)	0.095***	(0.021)
BookingDay35	0.144***	(0.036)	0.119***	(0.030)
BookingDay42	0.106**	(0.053)	0.108***	(0.042)
BookingDay49	0.163***	(0.060)	0.129***	(0.047)
BookingDay56	0.189**	(0.087)	0.158***	(0.051)
BookingDay63	0.166**	(0.066)	0.186***	(0.058)
BookingDay70	-0.024	(0.108)	0.274***	(0.063)
Tobit residual	-0.000	(0.001)	0.001	(0.001)
DUMMIES: MonthOfBooking	YES		YES	
Number of obs.	27,716		30,870	
R2	0.617		0.542	
Excluded instruments:	2		2	
KP LM stat.	$\chi^2(2)$ =258.9***		$\chi^2(2)$=343.3***	
Hansen J stat.	$\chi^2(2)$=0.040		$\chi^2(2)$=0.000	



H1: biz/lei routes



H2: biz/lei hour

H2: biz/lei hour

	Hour type			
	Business		Leisure	
AvailableSeats	-0.036***	(0.002)	-0.029***	(0.001)
BookingDay1	0.615***	(0.054)	0.608***	(0.036)
BookingDay4	0.371***	(0.048)	0.314***	(0.031)
BookingDay7	0.171***	(0.041)	0.110***	(0.026)
BookingDay10	0.138***	(0.033)	0.069***	(0.021)
BookingDay14	-0.021	(0.028)	-0.058***	(0.016)
BookingDay28	0.100***	(0.032)	0.065***	(0.018)
BookingDay35	0.105**	(0.043)	0.143***	(0.025)
BookingDay42	-0.013	(0.066)	0.163***	(0.035)
BookingDay49	0.102	(0.074)	0.177***	(0.040)
BookingDay56	0.113	(0.093)	0.209***	(0.053)
BookingDay63	0.202**	(0.089)	0.212***	(0.051)
BookingDay70	0.168	(0.115)	0.226***	(0.060)
Tobit residual	0.001	(0.001)	0.000	(0.001)
DUMMIES: MonthOfBooking	YES		YES	
Number of obs.	20,397		38,189	
R2	0.593		0.542	
Excluded inst.:	2		2	
KP LM stat.	$\chi^2(2)$ =343.1***		$\chi^2(2)$ =393.5***	
Hansen J stat.	$\chi^2(2)$ =0.098		$\chi^2(2)$ =0.007	

	Route type				Hour type			
	Business		Leisure		Business		Leisure	
HolidayPeriod	0.386***	(0.085)	0.109***	(0.029)	0.287***	(0.069)	0.155***	
LagMeanSlope	-2.320***	(0.016)	-2.212***	(0.007)	-2.364***	(0.019)	-2.164***	(0.001)
BookingDay1	-30.973***	(0.111)	-29.413***	(0.040)	-31.272***	(0.100)	-29.855***	(0.047)
BookingDay4	-24.924***	(0.114)	-24.516***	(0.044)	-25.739***	(0.106)	-24.666***	(0.041)
BookingDay7	-19.836***	(0.096)	-20.158***	(0.034)	-20.605***	(0.088)	-19.895***	(0.036)
BookingDay10	-14.372***	(0.107)	-15.463***	(0.040)	-15.595***	(0.099)	-14.952***	(0.029)
BookingDay14	-9.163***	(0.070)	-10.025***	(0.024)	-9.703***	(0.064)	-9.588***	(0.024)
BookingDay28	8.442***	(0.085)	9.182***	(0.027)	9.156***	(0.080)	8.719***	(0.023)
BookingDay35	16.392***	(0.138)	16.404***	(0.040)	16.465***	(0.116)	16.568***	(0.034)
BookingDay42	22.188***	(0.175)	23.001***	(0.053)	22.854***	(0.159)	22.787***	(0.045)
BookingDay49	26.091***	(0.271)	27.560***	(0.066)	27.260***	(0.220)	27.229***	(0.055)
BookingDay56	27.272***	(0.300)	29.999***	(0.083)	27.394***	(0.302)	29.854***	(0.060)
BookingDay63	27.571***	(0.489)	30.895***	(0.112)	28.009***	(0.426)	30.554***	(0.068)
BookingDay70	27.711***	(0.437)	33.309***	(0.119)	29.183***	(0.409)	32.046***	(0.068)
Tobit residual	0.838***	(0.005)	0.955***	(0.002)	0.860***	(0.004)	0.931***	(0.001)
DUMMIES:								
MonthOfBooking	YES		YES		YES		YES	
Number of obs.	27,716		30,870		20,397		38,189	
R2	0.948		0.984		0.952		0.976	

H3: lei/biz route + lei/biz hour

Conclusions

- First, customer segmentation can be pursued even within a business model defined by a standard unsegmented pricing approach where the airline offers a single category of fares
- Second, both the capacity and the temporal dimensions of RM are found to be important drivers of fares; therefore, looking at the evolution of fares over time without controlling for the evolution of available seats on a flight is likely to produce biased inferences.
- Third, the relative role of the two dimensions vary with the market characteristics; they are both paramount in flights operated during business hours in routes with a large potential business travellers' basis, whereas they play a less noticeable role when flights are operated in both leisure times and routes. The overall conclusion is that by fine-tuning its RM approach, an LCC can effectively manage consumer and product
- heterogeneity without disrupting its business model based on 'simple, low fares'.