



Modeling the Joint Choice of an Airline Itinerary and Fare Product:

Implications for Airline Pricing Strategies

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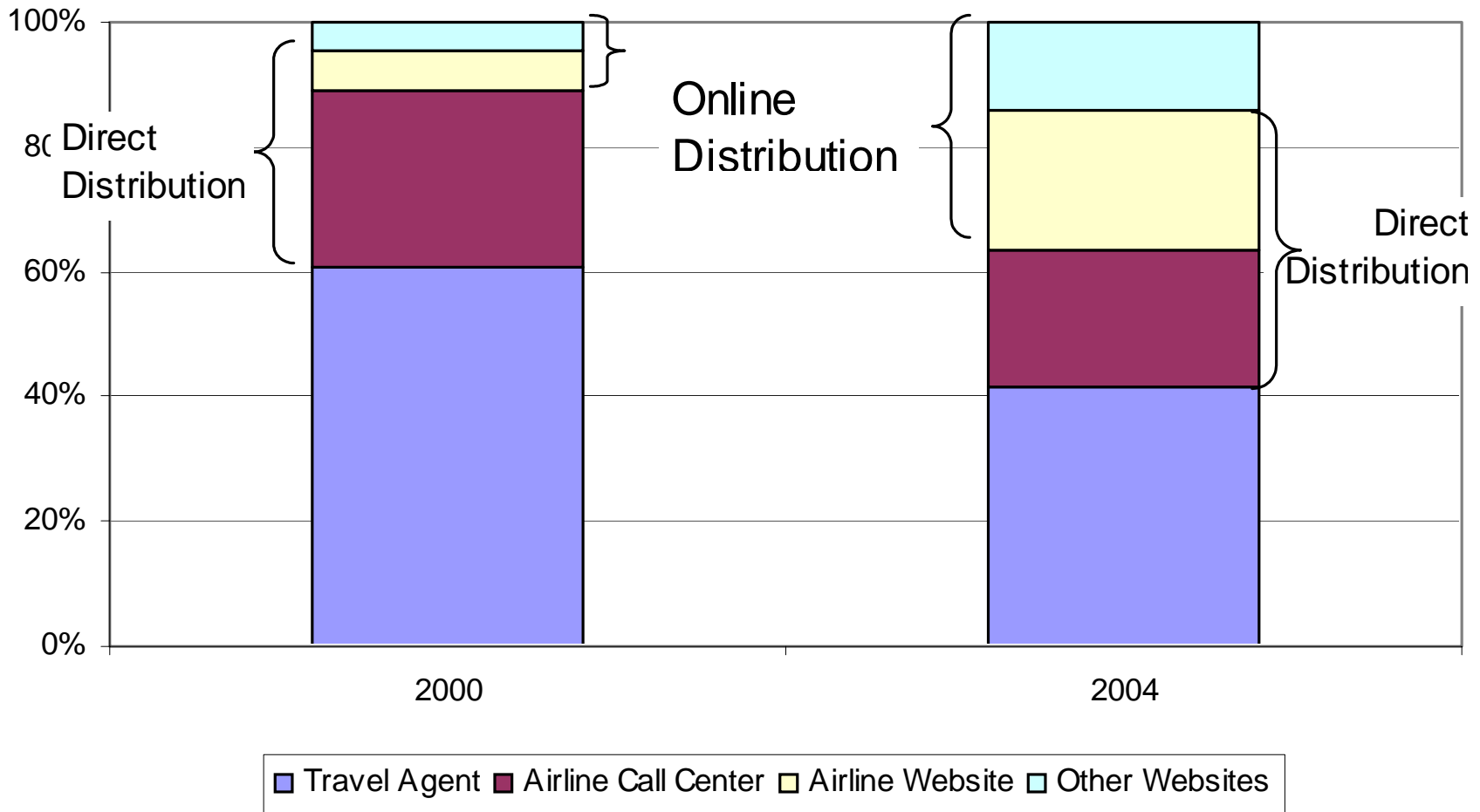
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- Two major changes in the airline industry since 2000
 - The rapid growth of low-cost airlines leading to new pricing practices (fare simplification)
 - The development of web-based distribution of airline tickets that increased direct consumer access to fare information and price transparency in the market
- These elements have undermined the pricing and distribution strategies of legacy carriers and have changed the choice behavior of the traveling public
- Understanding passenger choice behavior may help airlines adapt their pricing and distribution strategies to this new environment

Distribution Channel of Airline Tickets (NWA Ticket Sample)



The distribution of airline tickets shifted from offline travel agents to direct and online distribution

- Develop a study of the joint choice of an itinerary and fare product based on past booking records
 - Reconstruct the passenger choice set at the time of the booking by collecting fare class availability data and applying fare rules
 - Include socio-economic characteristics of the decision-maker
 - Treat missing data as latent constructs, such as for instance trip purpose
- Provide a tool to analyze the impact of airline pricing strategies
 - Design of new fare rules

- Two types of data
 - Booking
 - Fare Class Availability
- Data source: Amadeus
 - PNR booking data for Amadeus system user airlines such as Air France
 - Fare Class Availability Data for future departures (daily extract over a three-month period)
- Booking Data Collection Period
 - May 26-31, 2005
 - July 1-7, 2005



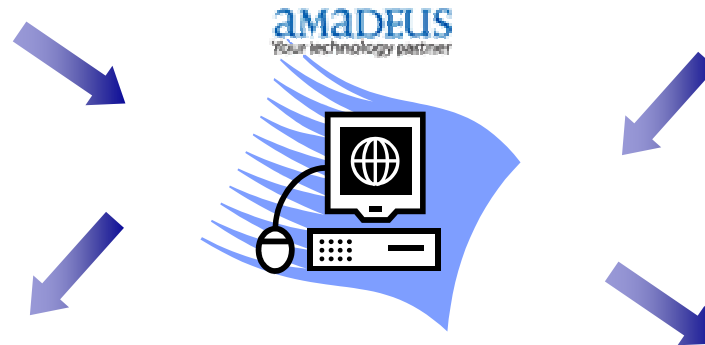
Product	AF Fare Code	FP Category	OW Fare (HAM)	AP	Canc. Fee	Change Fee
1	NWKEND	Weekend	103 €	1	Not Permitted	Not Permitted
2	NAP30	SN	96 €	30	Not Permitted	Not Permitted
3	EAP21	SN	123 €	21	120 EUR	60 EUR
4	WAP14	SN	156 €	14	120 EUR	60 EUR
5	QAP7	SN	197 €	7	120 EUR	60 EUR
6	MSX0	SN	258 €	0	120 EUR	60 EUR
7	AWEEK21	Week	215 €	21	Not Permitted	Not Permitted
8	UWEEK14	Week	282 €	14	Not Permitted	Not Permitted
9	UWEEK7	Week	369 €	7	Not Permitted	Not Permitted
10	RWEEK	Week	429 €	0	Not Permitted	60 EUR
11	B/BFIRME	Flex	381 €	0	None	None
12	S/SFIRME	Flex	481 €	0	None	None

Source: Travelocity (Sabre), Amadeus



Booking Date:
June 22, 2005 (AP=15)
Outbound Departure Date:
Thursday, July 7, 2005
Inbound Departure Date:
Saturday, July 9, 2005

Booking Date:
June 22, 2005 (AP=15)
Outbound Departure Date:
Thursday, July 7, 2005
Inbound Departure Date:
Monday, July 11, 2005



	AF 1048	AF1148	AF1348
NWKEND	N	N	N
NAP30	N	N	N
EAP21	N	N	N
WAP14	N	N	N
QAP7	N	N	N
MSX0	N	N	N
AWEEK21	N	N	N
UWEEK14	Y	N	N
UWEEK7	(Y)	N	N
RWEEK	(Y)	N	N
B/BFIRME	Y	Y	Y
S/SFIRME	Y	Y	Y

AF 1048, CDG-BCN, 6:40 a.m.:
Y9S9B9K9H9R9M9T9Q9V9L9X9U9W9E9A0N0I0

AF 1148, CDG-BCN, 7:45 a.m. :
Y9S9B9K4H4R0M0T0Q0V0L0X0U0W0E0A0N0I0

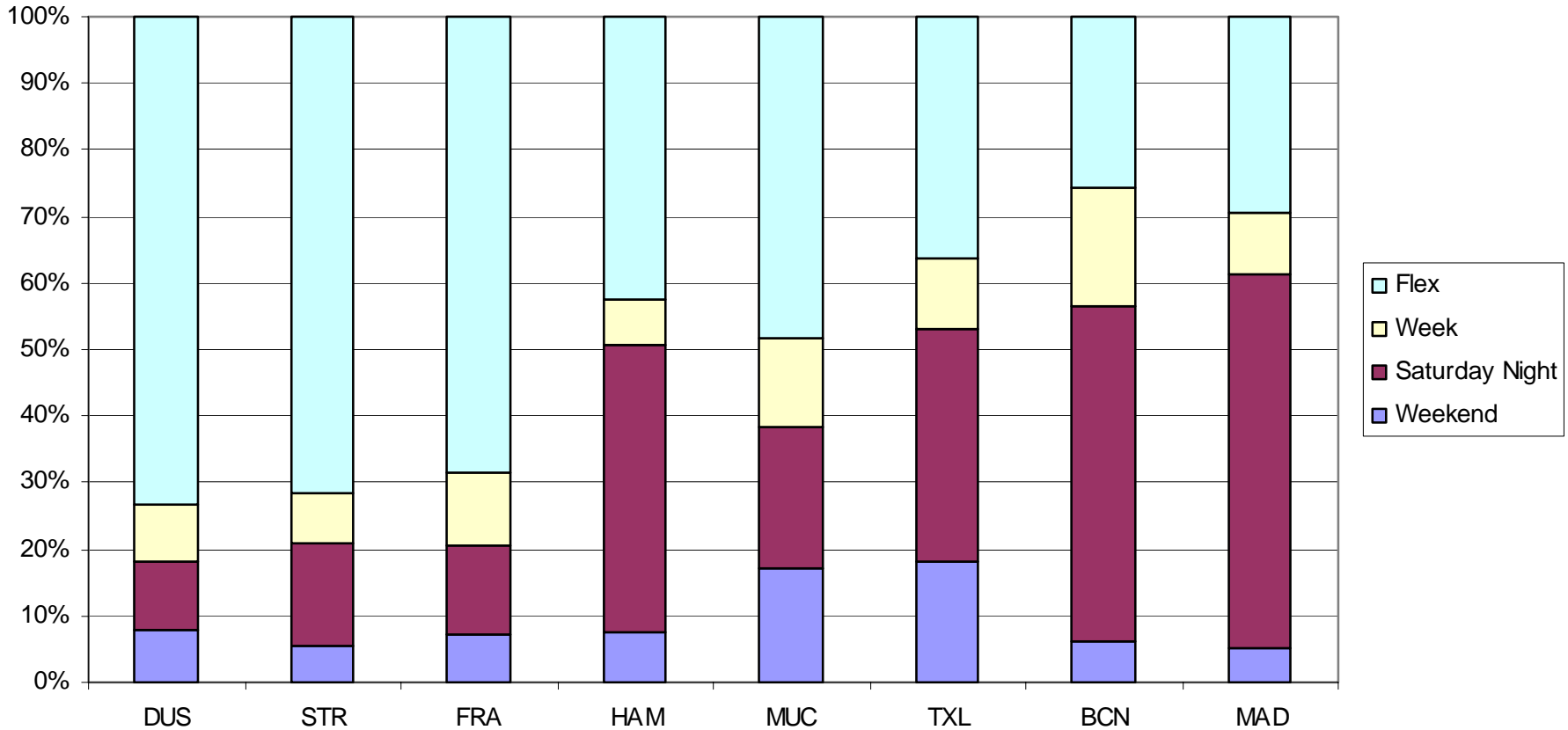
AF 1348, CDG-BCN, 10 a.m. :
Y9S9B4K3H3R0M0T0Q0V0L0X0U0W0E0A0N0I0

**Choice: AF 1048, UWEEK14,
178.58 EUR OW**

	AF 1048	AF1148	AF1348
NWKEND	N	N	N
NAP30	N	N	N
EAP21	N	N	N
WAP14	Y	N	N
QAP7	(Y)	N	N
MSX0	(Y)	N	N
AWEEK21	N	N	N
UWEEK14	Y	N	N
UWEEK7	(Y)	N	N
RWEEK	(Y)	N	N
B/BFIRME	Y	Y	Y
S/SFIRME	Y	Y	Y

**Choice: AF 1048, WAP14,
116.08 EUR OW**

Exploratory Analysis of the Booking Data: Distribution by Fare Product Category



➔ Markets can be classified by their degree of business travel orientation based on the mix of bookings by fare product category

- Dependent Variable
 - Combination of an itinerary and a fare product
 - The fare structure is similar in all markets and includes 12 different fare products (except for MAD)
 - The number of alternatives depends on the number of daily flights operated by AF in the market and varies from 48 (HAM) to 136 (MAD)
- A Logit Choice Model
 - Fare
 - Schedule Dummies
 - AM Peak (Flight Departure Time before 9 a.m.)
 - Morning (9-12 noon)
 - Afternoon (12-7 p.m.)
 - Evening (after 7 p.m.)
- Two Classes of Travelers
 - Gender (Male)
 - Frequent Flyer Status
 - Booking through an Offline Travel Agent

Estimation Results: One-Class Model Germany Business Markets (DUS, FRA & STR)

	Value	t-test
AMPEAK	1.6622	15.92
MORNING	0.6254	5.43
AFTERNOON	0.3154	3.02
FARE RESTRICTED	-0.0161	-24.29
FARE FLEX	-0.0116	-24.16
Log LL	-5702.43	

- Fare sensitivity is greater for restricted fare products
- Outbound early morning departures are particularly attractive in these markets, reflecting the typical preference of business travelers

Estimation Results: Two-Class Model Germany Business Markets (DUS, FRA & STR)

	2-class Model			
	Segment 1		Segment 2	
	Value	t-test	Value	t-test
AMPEAK	2.1153	12.3864	0.3167	1.3402
MORNING	0.8037	4.4728	0.3899	1.8562
AFTERNOON	0.5858	3.5832	-0.1122	-0.5576
FARE RESTRICTED	-0.0135	-13.504	-0.0218	-12.6476
FARE FLEX	-0.0081	-10.1353	-0.0201	-11.947
CLASS SIZE	76.7%		23.3%	
Offline Travel Agent	3.6498	3.5643		
Gender	-0.4599	-1.6629		
Elite	2.4946	2.4767		
Log LL	-5602.43			

	Segment 1	Segment 2
CLASS SIZE	76.7%	23.3%
Offline Travel Agent	88.3%	11.7%
Gender (Male)	77.5%	22.5%
Elite	92.8%	7.2%

- Identified two separate segments of air travel demand with a different sensitivity to fare and schedule preferences
 - One segment appears to be more oriented toward business-type frequent travelers, booking through offline travel agents while the other segment is more oriented toward leisure-type travelers
 - Frequent flyer status and distribution channel of the ticket have a stronger impact on class membership than general socio-economic characteristics such as gender
- Fare sensitivity varies between the two classes of airline travelers with business-type passengers being less sensitive to price
- Preference for a particular schedule varies based on the profile of the traveler
 - Early morning departures are more attractive to business-type passengers

- First to study the joint choice of an itinerary and a fare product
 - Collected a unique dataset in which booking data is matched with availability data to reconstruct the passenger choice set at the time of the booking
 - Incorporate the impact of both airline pricing (fare rules) and revenue management (fare class availability)
- Estimated a latent class model of airline passenger choice
 - Provide an alternative to the traditional segmentation of airline travel demand based on trip purpose missing in airline booking records
 - Identify several segments of airline demand with different behavioral characteristics based solely on data available in passenger booking records such as the characteristics of the traveler and the trip
- Plans to develop a choice-based procedure to evaluate airline pricing decisions
 - Design of new fare rules
 - Introduction of additional fare levels