Contents

Li	List of Figures					X			
Li	st of	Tables				Х	XI		
No	omen	aclature			X	X	III		
м	athe	matical Nomenclature			2	X2	xv		
м	athe	matical Notation		2	C	X	VII		
I	Dy	namic Pricing in the Airline Industry					1		
1	Intr	oduction					3		
-	1.1	The Passenger Airline Industry					3		
	1.2	The Low Cost Revolution					6		
	1.2						11		
2	Motivation and Structure 15								
	2.1	Relevance of the Topic					15		
	2.2	Focus on the Airline Industry					18		
	2.3	Objective and Differentiation					19		
	2.4	Structure of Work	•	•		•	20		
3	Dyr	namic Pricing					23		
	3.1	Definition and Scope		•			23		
		3.1.1 Introduction to Pricing					23		
		3.1.2 Dynamic Pricing and Revenue Optimization					25		
	3.2	Literature Overview					31		
		3.2.1 Demand Learning Models							
		3.2.2 Non-learning Pricing Models							
		3.2.2.1 Dynamic Pricing with Myopic Customer					45		



		3.2.2.2 Dynamic Pricing with Strategic Customers	51
		3.2.2.3 Customer Choice Models	53
	3.3	Limitations and Shortcomings	54
		3.3.1 Dynamic Pricing Models	54
		3.3.2 Demand Learning Models	56
	3.4	Proposed Approach	58
II	Fo	orecasting Latent Demand	63
Pa	rt II	Objective	65
4	Self	Learning Linear Models	67
	4.1	Linear Regression Models	68
	4.2	Bayesian Statistics	79
		4.2.1 Bayesian Probabilities	80
		4.2.2 Bayesian Inference	83
	4.3	Bayesian Linear Regression	85
		4.3.1 Parameter Distribution	85
		4.3.2 Predictive Distribution	89
	4.4	Critique and Limitations	92
5	Den	nand in Low Cost Markets	97
	5.1	Experimental Data Set	97
		5.1.1 Data Collection	98
		5.1.2 Data Cleansing	101
	5.2	Overarching Long-term Characteristics	103
		5.2.1 Log-linear Demand Structure	104
		5.2.2 Macro-Seasonalities and Trends	110
		5.2.3 Similarities of Adjacent Flights	113
	5.3	Short-term Characteristics	115
		5.3.1 Time Series Disruption Through Outliers	116
		5.3.2 Patterns Based on Departure Weekdays	121
		5.3.3 Micro-Seasonalities along Observation Weekdays	125
		5.3.4 Cross-Effects of Departure and Observation Weekdays	128
	5.4	Implications for Forecasting Model	129
6	The	- Demand Porceasing Model	131
	6.1	Linear Basis Function Model	131
		6.1.1 Indexing and Data Transformation	132
		6.1.2 Driving Model Parameters	134

		6.1.3	Model Specification and Re-transformation		138
		6.1.4	Frequentist Coefficient Weights		
	6.2	Model	Validation		
		6.2.1	Model and Coefficient Significance		
		6.2.2	Prerequisites and Assumptions		
	6.3	-	an Learning Mechanism		
		6.3.1	Online Demand Learning		147
		6.3.2	Overarching Demand Structures and Prior		
			Demand Knowledge	•••	153
7	Cor	nputat	ional Results and Evaluation		159
•	7.1	-	mance of the Naïve Bayesian Scheme		
		7.1.1	Distribution Convergence Speed		
		7.1.2	Forecast Quality and Accuracy		
	7.2	Sensiti	ivity of Forecast Accuracy		
		7.2.1	Improvement Through Informed Priors		
		7.2.2	Sizing of Learning window		
		7.2.3	Granularity of Forecasting Basis		
		7.2.4	Combined Effects		
	7.3	Recom	nmended Approach		
8	Sun	nmary	and Outlook		189
11	I	Estim	ating Price Sensitivity	-	199
p.	ort II	(I Obje	octivo		201
1 0	ar (1)	u obje			201
9			Customer Choice Analysis		203
	9.1		mentals of Choice Modeling		
	9.2		nts of a Choice Decision Process		
		9.2.1	Decision Maker and its Characteristics		
		9.2.2	Choice Set		
		9.2.3	Alternative Attributes		
		9.2.4	Decision Rule		
	9.3		dual Choice Behavior		
		9.3.1	Economic Utility-based Consumer Theory		
		9.3.2 9.3.3	Deterministic Choice Theory		
		433	FIODADINSING UNDICE EDEOTV		210
	0.4				
	9.4		Interview <t< td=""><td></td><td>217</td></t<>		217

		9.4.2	Specific Properties and Limitations			. 220
		9.4.3	Coefficient Estimation			. 224
		9.4.4	Tests of Model Specifications	•••	•	. 226
10	Cho	ice Sit	uation in Low-Cost Markets			233
	10.1	Experi	mental Data Set			. 233
			t Overview			
		10.2.1	Market Participants and Supply			. 238
		10.2.2	Pricing Environment and Behavior			. 239
	10.3		ved Demand Behavior			
		10.3.1	Price Sensitivity			. 243
		10.3.2	Schedule Preference			. 247
		10.3.3	Booking Day Preference			249
	10.4		ations for Choice Model			
11	Mul	tinom	ial Logit Model for Low-Cost Travel Choice			253
	11.1	Model	ing Constraints and Specifics			255
			Building and Goodness of Fit			
		11.2.1	Internal Choice Drivers			262
			Decision Maker Characteristics			
			External Outbound Choice Drivers			
		11.2.4	External Inbound Choice Drivers			294
12	Con	iputat:	ional Results and Evaluation			303
	12.1	Predic	tive Model Performance			303
	12.2	Choice	Elasticities of Fare Changes	•		311
			ations to Dynamic Airfare Pricing			
13	Sum	mary	and Outlook			319
Ap	pend	lix				329
Bibliography						331