

# NICOLAS PADILLA

(Updated August 2019)

## Columbia Business School

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## 1 EDUCATION

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Expected 2020	Ph.D. in Marketing, Columbia Business School, <b>Columbia University</b>
2018	MPhil. in Marketing, Columbia Business School, <b>Columbia University</b>
2014	MSc. in Operations Management, <b>University of Chile</b>
2014	Industrial Engineering, <b>University of Chile</b>
2011	BSc. in Engineering Science, <b>University of Chile</b>

## 2 RESEARCH INTERESTS

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### Topics

Customer preferences, Customer journey, Customer dynamics, Customer management

### Methods

Bayesian statistics and econometrics, Probabilistic Machine Learning, Bayesian nonparametrics

## 3 DISSERTATION

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### Title

“Estimating customer preferences with limited information”

### Committee

Oded Netzer (co-advisor), Eva Ascarza (co-advisor), Asim Ansari

## 4 WORKING PAPERS

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Padilla, Nicolas and Eva Ascarza (2019), “The Value of First Impressions: Leveraging Acquisition Data for Customer Management”

Revise and resubmit at *Journal of Marketing Research*

(1st dissertation essay)

Padilla, Nicolas, Eva Ascarza and Oded Netzer (2019), “The Customer Journey as a Source of Information”

Job market paper

(2nd dissertation essay)

Padilla, Nicolas, Ricardo Montoya and Oded Netzer (2019), “Heterogeneity in HMMs: Allowing for Heterogeneity in the Number of States”

Under review at *Marketing Science*

## 5 RESEARCH IN PROGRESS

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“Understanding the Non-linear Customer journey: Identifying the moment of truth” coauthored with Oded Netzer and Vicki Morwitz.

“Avoiding Fifty Shades of Grey: Uncertainty in Customized Assortment Optimization” coauthored with Oded Netzer.

“Customer Bundling for Streaming Services” coauthored with Kinshuk Jerath and Fei Long.

“Disentangling the Short and Long-term Effects of Marketing Actions: A HMM Approach” coauthored with Ricardo Montoya, Oded Netzer, Eva Ascarza.

“Myopia vs Hyperopia: A joint model of discounting and regret” coauthored with Ran Kivetz.

“Gender Differences in Preferences for Meaningful Work” coauthored with Vanessa Burbano and Stephan Meier.

## 6 CONFERENCE TALKS

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“The Customer Journey as a Source of Information” *Marketing Science*. Department of Business Studies, University of Roma Tre, Rome, Italy. June 2019

“Heterogeneity in Hidden Markov Models” *Marketing Dynamics*. Southern Methodist University, Dallas, USA. July 2018

“The Value of First Impressions: Leveraging Acquisition Data for Customer Management” *Marketing Science*. Temple University, Philadelphia, USA. June 2018

“Leveraging Acquisition Data for Customer Relationship Management” *Marketing Science*. School of Management, Fudan University, Shanghai, China. June 2016

“Heterogeneity in Hidden Markov Models” *Marketing Science*. Johns Hopkins University, Baltimore, USA. June 2015

## 7 HONORS, GRANTS AND AWARDS

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AMA-Sheth Foundation Doctoral Consortium Fellow, 2018

Paul and Sandra Montrone Doctoral Fellowship, Columbia University, 2017

Quantitative Marketing and Structural Econometrics Workshop Fellow, Washington University, 2017

Doctoral Consortium Fellow, INFORMS, 2017

Doctoral Consortium Fellow, INFORMS, 2016

Amanda and Harold J Rudolph M.S. Scholarship, Columbia University, 2015-2016

Paul and Sandra Montrone Doctoral Fellowship, Columbia University, 2015

Ph.D. Program Fellowship, Columbia University, 2014-Present

Master Scholarship, Conicyt (National Commission for Scientific and Technological Research) - Chile, 2012

Dean's List Industrial Engineering, University of Chile, 2006-2010

## 8 TEACHING EXPERIENCE

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### Lecturer

#### Engineering Undergraduate

Marketing II (Probability models)

Industrial Engineering, University of Chile

Fall 2014

### Teaching Assistanship

#### MS and PhD

Marketing Models

Empirical Models I

Columbia Business School

Spring 2016, Spring 2018

Spring 2016, Spring 2018

#### MBA

Marketing [core]

Immersion Seminar: Internet Innovation

Developing Quantitative Intuition

Columbia Business School

Fall 2015, Fall 2016, Spring 2017, Fall 2017,

Fall 2018, Spring 2019

Summer 2017, Summer 2018

Fall 2015, Summer 2016, Summer 2017, Fall 2018

#### Executive MBA

Marketing Strategy

Systematic Creativity in Business

Columbia Business School

Fall 2015, Spring 2016, Fall 2016, Spring 2017,

Summer 2017, Fall 2017, Spring 2018

Summer 2016, Summer 2017, Summer 2018

#### Summer Immersion for high school students

Entrepreneurship and Innovation:

New Product Development

Columbia University

Summer 2015, Summer 2016

### Tutorial

#### Online course

Marketing Analytics

EdX (by Columbia University)

2018

## 9 INDUSTRY EXPERIENCE

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Director of Studies, Center for Retail Studies (CERET), University of Chile, Chile (2013-2014)

*Managing and implementing applied research projects and studies in association with the most relevant retailers of the country regarding a variety of complex marketing and operations challenges.*

Digital Project Analyst, Enjoy S.A., Chile (2011)

*Management of projects in the Digital Marketing department of one of the biggest casino chains in Chile. Responsible for developing marketing strategies to introduce, distribute and sell hotel stays through online channels.*

## 10 SELECTED DOCTORAL COURSEWORK

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<b>Course name</b>	<b>Instructor</b>
Empirical Models I	Asim Ansari
Bayesian Modeling and Computing	Asim Ansari
Bridging Behavioral Decision Making and Marketing Science	Ran Kivetz
Analytical Models	Kinshuk Jerath
Mathematical Models in Marketing	Rajeev Kohli
Applied Multivariate Statistics	Kamel Jedidi
Marketing, Decisions and Method	Donald Lehmann
Consumer Behavior I	Michel Pham, Bernd Schmidt
Consumer Behavior II	Eric Johnson
Foundations of Graphical Models	David Blei
Empirical Methods in MS/OM	Marcelo Olivares
Causal Inference	Jose Zubizarreta
Math Methods for Economists	Jaromir Nosal
Introduction to Econometrics I	Jushan Bai
Introduction to Econometrics II	Christoph Rothe
Economic Analysis I	Jeffrey Heal
Economic Analysis II	Jeffrey Heal
Economic Theory III	Paolo Siconolfi
Economic Theory IV	Paolo Siconolfi
Industrial Organization II	Katherine Ho

## 11 REFERENCES

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### **Oded Netzer**

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Columbia Business School  
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### **Eva Ascarza**

Jakurski Family Associate Professor of Business Administration  
Harvard Business School  
+1 617-495-8542  
eascarza@hbs.edu

### **Ricardo Montoya**

Associate Professor  
Industrial Engineering Department, University of Chile  
+56 229-784-943  
rmontoya@dii.uchile.cl

### **“The Customer Journey as a Source of Information”**

Padilla, Nicolas, Eva Ascarza and Oded Netzer

In high involvement purchases such as flights, insurance, and hotel stays, firms often observe at most only a handful of purchases during a customer lifetime. The lack of multiple past purchases often presents a challenge for firms to infer in each customer interaction whether the customer will buy, and if so, what product will they buy. Fortunately, in these contexts, prior to a purchase, firms often have access to rich information on the customer journey, over the course of which, customers reveal their preferences as they search and click on products prior to making a purchase.

The objective of this paper, is to study how firms can combine the information collected through the customer journey path from search to transaction together with any historical data about the customer to infer the customer’s preferences and likelihood of buying. We build a non-parametric Bayesian model that links the customer clicks over the course of a journey, and across journeys, with the customer’s history of purchases. The model accounts for what we call context heterogeneity, which are journey-specific preferences that depend on the context in which the journey is undertaken. To infer the customer’s preferences in the focal journey, our model leverages historical data from the customer’s previous journeys, information collected during the current journey as well rich information from other customers’ with similar journeys.

We apply our model in the context of airline ticket purchases using data from one of the largest travel search websites. We show that our model is able to accurately infer preferences and predict choice in an environment characterized by very thin historical data. We also demonstrate the superior performance of our model relative to models that only use historical purchase data. The model that leverages the customer journey information can be used by firms for product recommendation in a dynamic environment where flights availability and prices are changing frequently.

### **“The Value of First Impressions: Leveraging Acquisition Data for Customer Management”**

Padilla, Nicolas and Eva Ascarza

*Based on dissertation essay 2, invited for revise and resubmit at Journal of Marketing Research*

Managing customers effectively is crucial for firms long-term profitability. By understanding differences across customers, firms can tailor their activities towards those customers for whom the intervention will pay off, therefore increasing the value of customers while maximizing the return on the marketing efforts. Targeting effectively ultimately depends in the firms ability to precisely estimate differences across customers — a very difficult task when firms attempt to manage recently-acquired customers for whom only the first purchase has been observed.

We propose a model that allows marketers to form “first impressions” of customers right after having been acquired. We define a first impression as an inference (based on the observed behaviors at the moment of acquisition) that the firm makes about customers traits that are relevant for the firm (e.g., whether the customer will purchase again, how s/he will respond to specific marketing actions).

The main aspect of the model is that it captures latent dimensions that impact both the variety of behaviors collected at acquisition as well as future propensities to buy and to respond to marketing actions. Using probabilistic machine learning, we combine deep exponential families with the demand model, relating behaviors observed in the first purchase with consequent customer behavior. We first demonstrate that such a model is flexible enough to capture a wide range of heterogeneity structures (both linear and non-linear), thus being applicable to a variety of behaviors and contexts. We also demonstrate the model’s ability to handle large amounts of data while overcoming commonly faced challenges such as data redundancy, missing data, and the presence of irrelevant information. We then apply the model to data from a retail context and illustrate how the focal firm could form customers’ first impressions by merely using its transactional database. We show that the focal firm would significantly improve the return on their marketing actions if it targeted just-acquired customers based on their first impressions.

Most recent version available online at [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2933291](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2933291)

### **“Heterogeneity in HMMs: Allowing for Heterogeneity in the Number of States”**

Padilla, Nicolas, Ricardo Montoya and Oded Netzer

Hidden Markov Models (HMMs) have been widely used in marketing to study dynamics in customer behavior. HMMs have been successfully applied to model how customers transition among diverse latent states such as attention levels, web search behavior, customer’s relationships, and purchase intent. While most HMMs in marketing allow for heterogeneity in the model’s parameters, these models assume that the number of latent states is common across customers. In this work, we analyze the potential bias of making such an assumption, assess to what extent heterogeneity in the model’s parameters can mitigate the impact of such bias, and provide a mixture of HMMs model that relaxes this assumption.

Using a comprehensive Monte Carlo simulation exercise and secondary data from an online role playing game, we demonstrate that ignoring heterogeneity in the number of states could lead to model identification problems and to erroneous

interpretations of customer dynamics. In particular, we show that: (1) even when only a small proportion of customers have a larger number of latent states (as compared to the majority of customers), the best fitting model would be an expensive HMM in terms of number of states; (2) even when heterogeneity is accounted for in the HMM parameters, the inference from analyzing the population estimates, a common practice in the literature, can be biased; (3) even the individual-level estimates of customers with the correct number of states can be biased.

We propose a mixture of HMMs with different number of states to account for heterogeneity in the number of states which captures well the behavior at both individual and population level.