Workshop Pricing y Revenue Management - 16 y 17 de mayo 2014
Campus UTDT, Aula SV4, Buenos Aires, Argentina
Mapa: http://goo.gl/maps/VrVvK

Agenda Viernes

Encuentro Académico (charlas técnicas con contenido matemático, en inglés)

9:30-10:00: Acreditación

10:00-10:10: Bienvenida
10:10-11:00: Ponencia Plenaria “Introduction to Revenue Management and Pricing”, Richard Ratliff (Sabre)

11:00-11:30: Coffee Break

11:30-13:00: Sesión Invitada
- “Identifying Competitor Sets in the Hotel Industry”, Marcelo Olivares (Department of Industrial Engineering, University of Chile and Columbia Business School)
- “Dynamic Pricing Strategies in the Presence of Demand Shifts”, Denis Sauré (Department of Industrial Engineering, University of Chile)
- “Applying branching into pricing models”, Alejandra Bevacqua (Head Pricing Cono Sur, Nielsen Argentina)
- “Decision Rules for Pricing Diagnosis in Wholesale Retailer”, Claudio Pizarro (Penta Analytics and Department of Industrial Engineering, University of Chile)

13:00-14:30: Almuerzo (no provisto por la conferencia)

14:30-16:00: Sesión Plenaria
- Ponencia “Estimation of Choice-based Models Using Sales Data from a Single Firm”, Laurie Garrow (Georgia Institute of Technology)
- Ponencia “Assortment Optimization Under Variants of the Multinomial Logit Model”, Huseyin Topaloglu (Cornell University)

16:00-16:15: Coffee Break

16:15-17:45: Sesión Invitada
- “Revenue-Maximizing Rankings for Online Platforms with Quality-Sensitive Consumers”, Nicolas Stier-Moses (Universidad Torcuato Di Tella)
- “PricingGame - Experiencing the tasks of a revenue manager”, Bernardo K. Pagnoncelli (Business School, Universidad Adolfo Ibáñez)
- “A 'price balance statistic' for optimizing pricing strategies: a better estimation of elasticities and cross-elasticities”, Virginie Lurkin (Georgia Institute of Technology)
- “A Bayesian Approach to Optimal Pricing Using Business Rules”, Marcel Goic (Department of Industrial Engineering, University of Chile)
Encuentro Profesional (en castellano)

17:45-18:15: Acreditación

18:15-19:00: Ponencia Plenaria “Innovaciones y desafíos tecnicos en RM”, Guillermo Gallego (Industrial Engineering and Operations Research Department, Columbia University)

19:00-20:05: Panel “Pricing y RM para Retail: situación actual y desafíos”
- Carrefour Argentina (Federico Barberis Long, Director de Pricing)
- Nielsen Argentina (Alejandra Bevacqua, Head Pricing Cono Sur)
- Penta Analytics, Chile (Claudio Pizarro)

20:05-20:35: Cocktail Networking

20:35- 22:00: Panel “Pricing y RM para Turismo y Entretenimientos: situación actual y desafíos”
- Aerolíneas Argentinas (Mauricio Sana, Revenue Decision Support)
- Cines Hoyts Chile (Paola Bendec, Gerente comercial; y Tomás Ariel Bercovich Cibié, CEO, Zheta Pricing)
- Fen Hotels Argentina (Alejandro Frenkel, Director)
- LAN Argentina (Juan Manuel Valverde, Route Economics y Revenue Management)

Agenda Sábado

Encuentro Académico

9:30-10:00: Acreditación

10:00-11:00: Ponencia Plenaria “Some Lessons Learned About Choice-Based Revenue Management” (en inglés), Anton Kleywegt (Georgia Institute of Technology)

11:00-11:15: Coffee Break

11:15-12:45: Sesión Invitada (en castellano)
- “Favoritism and anonymity in auctions”, Leandro Arozamena (Universidad Torcuato di Tella) y Federico Weinschelbaum (Universidad San Andres)
- “Pricing in the corrugated cardboard industry”, Javier Marenco (papyro.com, Argentina)
- “Joint Optimization of Virtual Capacities and Bid-Prices for Revenue Management”, Gustavo Vulcano (New York University) y Alex Weil (University of Buenos Aires and Universidad Torcuato di Tella)

Organizadores: Marcelo Olivares (Universidad de Chile), Nicolás Stier-Moses (UTDT), Gustavo Vulcano (NYU Stern, Prof. Visitaante UTDT)

Patrocinan: Escuela de Negocios, UTDT; Departamento de Ingeniería Industrial, Universidad de Chile; Instituto Sistemas Complejos de Ingeniería (Chile); CONICET Argentina; CONICYT Chile
Leandro Arozamena (Universidad Torcuato di Tella) y Federico Weinschelbaum (Universidad San Andres)
Favoritism and anonymity in auctions

Abstract: When auctions are used, the seller is frequently not indifferent as to which of the bidders will win. She runs an auction to enhance competition but, for a given selling price, she would prefer some of the bidders to win rather than others. This may occur when some of the bidders' welfare positively influences the seller's welfare. There is favoritism when the seller has such a preference for some bidders over others. We characterize the optimal auction under favoritism, and then discuss possible ways to implement it. Additionally, we examine how that optimal auction would vary when the seller is not allowed to discriminate among bidders.

Alejandra Bevacqua (Head Pricing Cono Sur, Nielsen Argentina)
Applying branching into pricing models

Abstract: This study applies an econometric model of price elasticities for some countries in Latam. Its main purpose is to explain the behavior of alcoholic beverages sales due to price and promotion in the context of panel data. The estimates correspond to direct price elasticities and multipliers that measure cross and promotional activity and contribute building future scenarios and designing a marketing strategy for the brand. The methodology includes branching techniques to contemplate the differences between a variety impacts of the promotional periods and geographical areas.

Laurie Garrow, Georgia Institute of Technology
Estimation of Choice-based Models Using Sales Data from a Single Firm

Abstract: Choice-based revenue management (RM) problems use discrete choice models to predict product-level demands. The estimation of choice-based RM models involves solving for choice parameters as well as an arrival rate. The latter represents a measure of unconstrained demand, i.e., the population of customers who arrive and purchase a product from our firm as well as those who arrive and either decide to purchase a product from a competitor or not to purchase at all. Talluri and van Ryzin were the first to propose an estimation method for this problem in 2004. However, their method, which uses Expectation-Maximization (EM) routines to solve an expected log likelihood function, exhibits prohibitively long estimation times and often leads to counter-intuitive results. We reformulate the Talluri and van Ryzin method using marginal versus expected log likelihood functions. This enables us to eliminate the use of the EM algorithm, which results in solution times that are improved by orders of magnitude. We discuss theoretical properties of our marginal log likelihood formulation and prove our formulation converges to a local (and often global) optima. The proof is based on showing how the multi-dimensional non-concave nonlinear objective function can be reformulated as smaller, globally concave problem with an easy to find and unique solution, plus a single-dimensional nonlinear optimization problem. This work has been conducted with Drs. Jeff Newman, Mark Ferguson, and Tim Jacobs.

Marcel Goic, Department of Industrial Engineering, University of Chile
A Bayesian Approach to Optimal Pricing Using Business Rules

Abstract: Traditional approaches to price optimization take a two step approach to setting prices. First the parameters of the demand system are estimated given an observed dataset, and second this model is used for inference to make decisions about the optimal price. Often the optimal pricing solutions from the estimated demand model are non-sensical. Hence, the manager imposes a set of constraints on the feasible price space to find a more appropriate solution. This process is not consistent with a Bayesian approach, since the manager’s constraints on the price solution
represent prior information. This information should more appropriately be incorporated into the prior distribution of the parameter estimates. We show how constraints and statements about optimal prices imply informative prior distributions that can be used in a Bayesian approach. These prior distributions in turn influence the parameter estimates and subsequently the posterior distribution of optimal prices. In effect the Bayesian approach constrains the parameter space instead of the pricing decision space. The Bayesian method improves the quality of the pricing decisions made by managers and offers a consistent and scientific approach for incorporating managerial expertise into the pricing problem.

Anton Kleywegt, Georgia Institute of Technology

*Some Lessons Learned About Choice-Based Revenue Management*

Abstract: This presentation is based on an airline revenue management project involving a very competitive origin-destination market with many daily flights. We present different models that we estimated and tested, the ideas behind the models as well as the shortcomings of the models, the results and the lessons learned, as well as issues that remain to be addressed and plans for future work.

Virginie Lurkin, Georgia Institute of Technology

*A price balance statistic* for optimizing pricing strategies: a better estimation of elasticities and cross-elasticities

Abstract: Demand forecasting, price optimization and capacity controls form three major tools of revenue management. Over the past few decades, each discipline has generated a great deal of research but has typically been studied separately from the others. Yet, better understanding their relationship gives an airline the opportunity to increase its profitability. In prior work, Tim Jacobs and colleagues introduced a macro-level metric known as the ‘Price Balance Statistic (PBS)’ for evaluating the quality of a given pricing strategy and guiding a search algorithm to identify an optimal alignment between pricing structure, scheduled capacity and RM controls using marginal revenue principles. The aim of our work is to incorporate additional modeling improvements to the PBS. The current model formulation uses price elasticity as input parameters and assumes perfect independency between the different fare classes. However, in reality, a passenger demand fluctuates between classes based on differences in prices. We propose to use instrumented variable linear regression methods to obtain parameter estimates for price elasticities and cross-elasticities. This modification incorporates accurate price elasticities but also the impact of a change in one fare class on another through the cross-elasticities. This is joint work with M. Schyns (University of Liege ), L. Garrow (Georgia Institute of Technology), and T. Jacobs (American Airlines).

Javier Marenco (papyro.com, Argentina)

*Pricing in the corrugated cardboard industry*

Abstract: Corrugated cardboard is obtained by gluing together three or more rolls of paper, and its main use is in the construction of corrugated boxes for packing purposes. A typical corrugating machine allows the simultaneous production of items of two or more sizes, in order to reduce the paper waste. Programming orders in such a machine amounts, therefore, to solving a particular two-dimensional cutting stock problem, usually with linear programming techniques. In this work we analyse a pricing policy for the corrugated cardboard industry based on the shadow prices associated to the constraints of this cutting stock problem, formulated as a linear program. We discuss the benefits of this policy, and study its effectiveness on real data from a corrugating company. We also comment on some ideas for the allocation of production time in order to properly manage urgent orders, which are quite common in the corrugated cardboard industry. Joint work with Gustavo Braier.
Abstract: We develop a novel methodology to identify competitors in markets where spatial location is an important factor of differentiation. In differentiated product markets, determining the key competitors of a focal product requires a characterization of customer demand. This includes the identification of heterogeneous customer segments, their preferences for product attributes and the relative sizes of these segments in the customer population. The prevalent approach to characterize such a demand system is through a random utility model of customer choice. The existing methods used to estimate these models based on aggregate product sales data exploit variation in the set of product offerings to identify customer heterogeneity. Our proposed methodology uses a different empirical strategy to identify heterogeneity: while keeping the set of product offerings fixed, we use variation in observable attributes that determine the size of the distinct customer segments. This approach is useful to study markets where the set of product offerings and their characteristics are fixed or change infrequently. We apply our methodology in the hotel travel industry, where the characterization of key competitors is commonly used in practice to benchmark hotel performance. We collect publicly available data on local events to explain variation in customer segments, differentiating events by location and business/leisure purposes. Our methodology can be used effectively to characterize customer heterogeneity and identify the closest competitors to any focal hotel.

Bernardo K. Pagnoncelli, Assistant Professor, Universidad Adolfo Ibáñez Business School

PricinGame - Experiencing the tasks of a revenue manager

Abstract: I will present the web-based simulation PricinGame, developed by GameLab (www.gamelab.cl). The game is based on Kalyan Talluri’s “Customer Valuations Game” and the main goal is to introduce the basics of Revenue Management, highlighting the difficulty of setting prices in real-life situations. The game is played in four rounds with increasing levels of complexity, and it can be played in computers, tablets and smartphones with no required installation.

Claudio Pizarro, Universidad de Chile / Penta Analytics

Decision Rules for Pricing Diagnosis in Wholesale Retailer

Abstract: Every week there are many promotions (eg. discounts to specific products) in stores that increase sales of a particular product, but negatively affect the rest of the sku’s category through a cannibalization effect. The objective of this work is to build related product pricing rules to detect these cannibalization scenarios, looking for to avoid these events and to improve category performance over time. Through an unsupervised methodology called association rules, we identify different types of rules that find frequent scenarios where the order between selling prices allows increases in a pair of products. The project uses transactional data from a wholesale supermarket chain in Chile, analyzing the milk category. The results of these work are pricing rules between products and attributes, focusing on rules between brands.

Richard Ratliff, Sabre

Introduction to Revenue Management and Pricing

Abstract: This presentation will provide a brief discussion on: the evolution of revenue management (RM) methods and systems in the airline industry, several new RM techniques being used in practice, and potential future directions for RM technology. Richard Ratliff is a senior research scientist in the Sabre Holdings research group. He leads advanced R&D efforts in airline pricing and revenue management including collaboration with universities.
Denis Sauré, Department of Industrial Engineering, University of Chile

Dynamic Pricing Strategies in the Presence of Demand Shifts

Abstract: Many factors introduce the prospect of changes in the demand environment that a firm faces, with the specifics of such changes not necessarily known in advance. If and when realized, such changes affect the delicate balance between demand and supply and thus current prices should account for these future possibilities. We study the dynamic pricing problem of a retailer facing the prospect of a change in the demand function during a finite selling season with no inventory replenishment opportunity. In particular, the time of the change and the post-change demand function are unknown upfront and we focus on the fundamental trade-off between collecting revenues from current demand and doing so for post-change demand, with the capacity constraint introducing the main tension. We develop a formulation that allows to isolate the role of dynamic pricing in balancing inventory consumption throughout the horizon. We establish that in many settings optimal pricing policies follow a monotone path up to the change in demand. We show how one may compare upfront the attractiveness of pre- and post-change demand conditions, and how such a comparison depends on the problem primitives. We further analyze the impact of the model inputs on the optimal policy and its structure, ranging from the impact of model parameter changes to the impact of different representations of uncertainty about future demand.

Nicolas Stier-Moses (Universidad Torcuato Di Tella)

Revenue-Maximizing Rankings for Online Platforms with Quality-Sensitive Consumers

When a customer searches for a keyword at a classified ads website, at an online retailer, or at a search engine (SE), the platform has exponentially many choices in how to sort the output to the query. The two extremes are (a) to consider a ranking based on relevance only, which attracts more customers in the long run because of perceived quality, and (b) to consider a ranking based on the expected revenue to be generated by immediate conversions, which maximizes short-term revenue. Typically, these two objectives are not perfectly positively correlated and hence the main question is what middle ground between them should be chosen. We introduce stochastic models and propose effective solution methods that can be used to optimize the ranking considering long-term revenues. A key feature of our model is that customers are quality-sensitive and are attracted to the platform or driven away depending on the average relevance of the output. The proposed methods are of crucial importance in e-business and encompass: (i) classified ad websites which can favor paid ads by ranking them higher, (ii) online retailers which can rank products they sell according to buyers' interests and/or the margins these products have, (iii) SEs which can position the content that they serve higher in the output page than third-party content to keep users in their platforms for longer and earn more. This goes in detriment of just offering rankings based on relevance only and is directly linked to the current search neutrality debate. This is joint work with Pierre L'Ecuyer, Patrick Maillé, and Bruno Tuffin.

Huseyin Topaloglu, Cornell University

Assortment Optimization Under Variants of the Multinomial Logit Model

Abstract: We consider assortment optimization problems when customers choose according to variants of the multinomial logit model. In the basic assortment optimization setting, a firm has access to a set of products among which it chooses a subset of products to offer to its customers. Customers choose among the offered products according to a particular choice model. The goal of the firm is to figure out which subset of products to offer to maximize the expected revenue obtained from each customer. We consider three choice models that can govern customer choices. First, when customers choose according to the multinomial logit model, we show that the optimal assortment can be obtained through a linear program. This result extends to the case when there are certain constraints on what products can be offered. These constraints can take the form of cardinality constraints limiting the number of products that can be offered, or precedence constraints limiting what products need to be offered before others. Second, when customers choose according to the nested logit model, we show that the optimal assortment can be obtained in a tractable fashion.
Third, when customers choose according to a mixture of multinomial logit models, the assortment problem is known to be NP-complete. We show an approach to obtain upper bounds on the optimal expected revenue. By comparing the upper bound on the optimal expected revenue with the expected revenue from an assortment obtained through a heuristic, we can get a feel for the optimality gap of the heuristic. The work presented in this talk is joint work with James Davis, Jacob Feldman and Guillermo Gallego.

Gustavo Vulcano, New York University; and Alex Weil, University of Buenos Aires and UTDT

*Joint Optimization of Virtual Capacities and Bid-Prices for Revenue Management*

Abstract: We consider a network revenue management problem where the physical capacity is uncertain while the firm processes requests and/or not all the accepted requests show-up at the service delivery time. The controller sets a virtual capacity and a bid-price for each of the resources at the beginning of the finite horizon, and collects revenues using a standard bid-price policy. At the end of the horizon, the effective capacities and demands are realized, and the controller incurs a penalty cost for each bumped reservation. The firm’s objective is to maximize the total cumulative adjusted revenue (sales revenue minus penalty cost) obtained by the end of the horizon. We develop a stochastic gradient algorithm for this problem that converges (w.p.1) to a stationary point of the expected adjusted revenue function. Then, through an exhaustive numerical study, we show that our controls are computed within an order of magnitude faster computational time than other recent proposals for the overbooking problem, and that they deliver revenues that are comparable or higher than the ones obtained from those benchmarks.