

## **ANALYTICAL MODELS IN MARKETING**

47-753, Fall 2011

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Classroom: Posner 384

Time: MW 3:30-5:20

### **Objectives**

This course is designed with two objectives in mind. First, the course provides an in-depth knowledge of many substantive topics in marketing that are amenable to economic modeling and analysis. This knowledge will, hopefully, help you to appreciate and critique some of the major streams of quantitative marketing research, and to develop your own research interests. Second, the course is designed to familiarize you with the mechanics of some key modeling paradigms in marketing so that you can have a hands-on experience with the economic modeling of marketing phenomena.

This course will be useful for PhD students in Marketing, OM and IS even if they do not plan to conduct research in analytical modeling.

### **Course Requirements**

The course will meet twice each week for 110 minutes. You are expected to have completed the assigned readings before you come to each class and to be able to contribute to the class in a thoughtful manner. The class participation accounts for 30% of your final grade. This includes my assessment of whether you had read the papers or not. There will be one home work assignment, which will involve some basic mathematical modeling and manipulations. This will account for 30% of your final grade. A term paper is also required for this course, which will account for 40% of your final grade. Ideally, a good project paper is one that clearly defines a marketing problem amenable to economic modeling, sets up a reasonable model to address that problem, and draws some sensible conclusions based on technically correct analyses. I will offer as much help to you as I can, and you are also encouraged to help each other on the projects. I encourage you to choose to model a problem from your field of study. You will have an opportunity to present your research findings in the last class. For students with backgrounds not amenable to analytical modeling, we can discuss other options.

The following are the assigned readings. As you can see, each class is organized by topic. I will start off each class with a short overview. This will be followed by one or two student presentations, about 30 minutes each, from the papers marked by “\*\*”. I will ask for volunteers to present these papers. Finally, I will present the paper marked by “##” in each class. The aim of every presentation is to understand the key message of the paper being discussed, obtain a fair idea of the methodology and, most importantly, generate discussions.

The list of papers may change slightly as we proceed with the course. The papers are available from the CMU library. If you are unable to access a paper, email me.

If we miss a session due to a holiday, I will hold an extra class.

### **Week 1, Class 1: INTRODUCTION**

Moorthy, Sridhar (1985), "Using Game Theory to Model Competition," *Journal of Marketing Research*, 22, 252-282.

McAfee, R. Preston and John McMillan (1996), "Competition and Game Theory," *Journal of Marketing Research*, Vol. 33, No. 3 (Aug., 1996), pp. 263-267

### **Week 1, Class 2: PRICING**

Chen, Yuxin, Chakravarthi Narasimhan, and Z. John Zhang (2001), "Consumer Heterogeneity and Competitive Price-Matching Guarantees," *Marketing Science*, 20 (No. 3), pp. 300-314.

\*\* Chen, Yuxin, C. Narasimhan, and Z. John Zhang (2001), "Individual Marketing With Imperfect Targetability," *Marketing Science*, 20 (No. 1), pp. 23-41.

\*\* Xie, Jinhong and Steven Shugan (2001), "Electronic Tickets, Smart Cards, and Online Prepayments: When and How to Advance Sell," *Marketing Science*, Vol. 20, No. 3 (Summer, 2001), pp. 219-243.

## Jerath, Kinshuk, Serguei Netessine and Senthil Kumar Veeraraghavan (2010), "Revenue Management with Strategic Customers: Last-Minute Selling and Opaque Selling," *Management Science*, 56(3), 430-448.

Essegaier, Skander, Sunil Gupta and Z. John Zhang (2002), "Pricing Access Services," *Marketing Science*, 21(2), 139-159.

### **Week 2, Class 1: PROMOTIONS**

\*\* Varian, Hal R. (1980), "A Model of Sales," *American Economic Review*, vol. 70, no. 4, pp. 651-59.

Narasimhan, C. (1988), "Competitive Promotional Strategies," *Journal of Business*, 61, pp. 427-450.

Raju, J., V. Srinivasan, and R. Lal (1990), "The Effects of Brand Loyalty on Competitive Price Promotional Strategies," *Management Science*, 36, pp. 276-304.

Lal, R. (1990), "Price Promotions: Limiting Competitive Encroachment," *Marketing Science*, 9(3), 247-262.

\*\* Kim, B-D, M. Shi and K. Srinivasan (2001), "Reward Programs and Tacit Collusion," *Marketing Science*, 20(2), 99-120.

Adams, W.J. and J.L. Yellen (1976), "Commodity Bundling and the Burden of Monopoly," *American Economic Review*, 90(3), 475-498.

## Goic, M., K. Jerath and K. Srinivasan (2010), "Cross-Market Discounts," *Marketing Science*, 30(1), 134-148.

## **Week 2, Class 2: ADVERTISING**

Nelson, P. (1974), "Advertising as Information," *Journal of Political Economy*, 82(4), 729-754.

Mayzlin, D. and J. Shin (2010), "Uninformative Advertising as an Invitation to Search," working paper.

\*\* Iyer, G., D. Soberman and J.M. Villas-Boas (2005), "The Targeting of Advertising," *Marketing Science*, 2005, 24, 461-476.

\*\* Chen, Yuxin, Yogesh V. Joshi, Jagmohan S. Raju and Z. John Zhang (2009), "A Theory of Combative Advertising," *Marketing Science*, 28(1), 1-19.

Villas-Boas, J. Miguel (1993), "Predicting Advertising Pulsing Policies in an Oligopoly: A Model and Empirical Test," *Marketing Science*, 1993, 12, 88-102.

Edelman, B., M. Ostrovsky and M. Schwarz (2007), "Internet Advertising and the Generalized Second-Price Auction: Selling Billions of Dollars Worth of Keywords," *American Economic Review*, 97(1), 242-259.

## Jerath, Kinshuk, Liye Ma, Young-Hoon Park and Kannan Srinivasan (2010), "A "Position Paradox" in Sponsored Search Auctions," *Marketing Science*, 30(4), 612-627.

## **Week 3, Class 1: CHANNELS**

\*\* McGuire, T. and R. Staelin (1983), "An Industry Equilibrium Analysis of Downstream Vertical Integration," *Marketing Science*, 2(2), 161-191.

## Moorthy, S. (1988), "Managing Channel Profits: Comment," *Marketing Science*, 6(4), 375-379.

Geylani, T., A. Dukes and K. Srinivasan (2007), "Strategic Manufacturer Response to a Dominant Retailer," *Marketing Science*, 26(2), 164-178.

Balasubramanian, Sridhar (1998), "Mail vs. Mall: A Strategic Analysis of Competition between Direct Marketers and Conventional Retailers," *Marketing Science*, 17(3), 181-195.

## Jerath, Kinshuk and Z. John Zhang (2010), "Store Within a Store," *Journal of Marketing Research*, XLVII(August), 748-763.

## **Week 3, Class 2: PRODUCT DESIGN**

Mussa, M. and S. Rosen (1978), "Monopoly and Product Quality," *Journal of Economic Theory*, 18, 301-317.

\*\* Moorthy, S. (1984), "Market Segmentation, Self Selection and Product Line Design," *Marketing Science*, 3(4), 288-307.

\*\* Wernerfelt, B. (1988), "Umbrella Branding as a Signal of New Product Quality: An Example of Signalling by Posting a Bond," *RAND Journal of Economics*, 19(3), 458-466.

Moorthy, S. and K. Srinivasan (1995), "Signaling Quality with a Money-Back Guarantee: The Role of Transaction Costs," *Marketing Science*, 14(4), 442-466.

## Geylani, T., K. Jerath and Z.J. Zhang, "Store Loyalty and Competitive Store Brand Strategy," working paper.

#### **Week 4, Class 1: PRODUCT POSITIONING**

\*\* Hotelling, H. (1929), "Stability in Competition," *The Economic Journal*, 39(153), 41-57.

\*\* d'Aspremont, C., J.J. Gabszewicz and J.F. Thisse (1979), "On Hotelling's "Stability in Competition"," *Econometrica*, 47(5), 1145-1150.

Salop, S. (1979), "Monopolistic Competition with Outside Goods," *Bell Journal of Economics*, 10(1), 141-156.

Sayman, S., S.J. Hoch, J.S. Raju (2002), "Positioning of Store Brands," *Marketing Science*, 21(4), 378-397.

## Jerath, K. and S. Lopez, "Impact of Urban Sprawl on Pricing and Location of Retail Outlets," working paper.

#### **Week 4, Class 2: BARGAINING**

\*\* Nash, J. (1950), "The Bargaining Problem," *Econometrica*, 18(2), 155-162.

## Rubinstein, A. (1982), "Perfect Equilibrium in a Bargaining Model," *Econometrica*, 50, 97-109.

\*\* Iyer, Ganesh and Miquel Villas-Boas (2003), "A Bargaining Theory of Distribution Channels," *Journal of Marketing Research*, XL(February), 80-100.

#### **Week 5, Class 1: INCORPORATING BEHAVIORAL ASSUMPTIONS**

Simon, Herbert (1955), "A Behavioral Model of Rational Choice," *Quarterly Journal of Economics*, 69(1), 99-118.

\*\* Feinberg, F., A. Krishna and Z.J. Zhang (2002), "Do We Care What Others Get? A Behaviorist Approach to Targeted Promotions," *Journal of Marketing Research*, XXXIX(August), 277-291.

## Cui, T.H., J.S. Raju and Z.J. Zhang (2007), "Fairness and Channel Coordination," *Management Science*, 53(8), 1303-1314.

\*\* Lim, N. and Ho T-H (2007), "Designing Price Contracts for Boundedly Rational Customers: Does the Number of Blocks Matter?" *Marketing Science*, 26 (3), 312-326.

Gabaix, Xavier and David Laibson (2006), "Shrouded Attributes, Consumer Myopia, and Information Suppression in Competitive Markets," *Quarterly Journal of Economics*, 121(2), 505-540.

## **Week 5, Class 2: IMPACT OF INTERNET**

\*\* Iyer, G. and A. Pazgal (2003), "Internet Shopping Agents: Virtual Co-Location and Competition," *Marketing Science*, 22(1), 85-106.

\*\* Kuksov, D. (2004), "Buyer Search Costs and Endogenous Product Design," *Marketing Science*, 23(4), 490-499.

Lal, R. and M. Sarvary (1999), "When and how is the Internet likely to decrease price competition?" *Marketing Science*, 18 485-503.

Zettelmeyer, Florian (2000), "Expanding to the Internet: Pricing and Communication Strategies When Firms Compete on Multiple Channels," *Journal of Marketing Research*, XXXVII(August), 292-308.

## Jiang, B., K. Jerath and K. Srinivasan (2010), "Firm Strategies in the 'Mid-Tail' of Platform-Based Retailing," *Marketing Science*, forthcoming.

Edelman, B., M. Ostrovsky and M. Schwarz (2007), "Internet Advertising and the Generalized Second-Price Auction: Selling Billions of Dollars Worth of Keywords," *American Economic Review*, 97(1), 242-259.

Jerath, Kinshuk, Liye Ma, Young-Hoon Park and Kannan Srinivasan (2010), "A "Position Paradox" in Sponsored Search Auctions," *Marketing Science*, 30(4), 612-627.

## **Week 6, Class 1: SALESFORCE COMPENSATION**

## Basu, A., Lal, R., S. Srinivasan and R. Staelin (1985), "Salesforce Compensation Plans: An Agency Theoretic Perspective," *Marketing Science*, 4(4), 267-291.

## Raju, J.S. and S. Srinivasan (1996), "Quota-Based Compensation Plans for Multiterritory Heterogeneous Salesforces," *Management Science*, 42(10), 1454-1462.

\*\* Lal, R. and R. Staelin (1986), "Salesforce Compensation Plans in Environments with Asymmetric Information," *Marketing Science*, 5(3), 179-198.

## Gonik, J. (1978), "Tie Salesmen's Bonuses to Their Forecasts," *Harvard Business Review*, May 1 1978.

Prendergast, Canice (2000), "What Trade-Off of Risk and Incentives?" *American Economic Review*, 90(2), 421-425.

Simester, D. and J.J. Zhang (2010), "Why Are Bad Products So Hard to Kill?" *Management Science*, 56(7), 1161-1179.

## **Week 6, Class 2: DURABLE GOODS**

## Waldman, M. (2003), "Durable Goods Theory for Real World Markets," *Journal of Economic Perspectives*, 17(1), 131-154.

\*\* Desai, Preyas and Devavrat Purohit (1998), "Leasing and Selling: Optimal Strategies for a Durable Goods Firm," *Management Science*, 44 (11), S19-S34.

\*\* Desai, Preyas and Devavrat Purohit (1999), "Competition in Durable Goods Markets: The Strategic Consequences of Leasing and Selling," *Marketing Science*, 18(1), 42-58.

Bhaskaran, S. and S. Gilbert (2005), "Selling and Leasing Strategies for Durable Goods with Complementary Products," *Management Science*, 51(8), 1278-1290.

### **Week 7, Class 1: MARKETING/OPERATIONS INTERFACE**

\*\* Lester, Benjamin (2010), "Information and Prices with Capacity Constraints," *American Economic Review*, forthcoming.

Netessine, S. and T. Taylor (2007), "Product Line Decisions and Production Technology," *Marketing Science*, 26(1), 101-117.

Desai P., O. Koenigsberg and D. Purohit (2007), "The Role of Production Lead Time and Demand Uncertainty in Durable Goods Market," *Management Science*, 53(1), 150-158.

Krishnan, H. and R. Winter (2007), "Vertical Control of Price and Inventory," *American Economic Review*, 97(5), 1840-1857.

Cachon, G. and R. Swinney (2009), "Purchasing, Pricing, and Quick Response in the Presence of Strategic Consumers," *Management Science*, 55(3), 497-511.

\*\* Anand, K.S., M.F. Pac and S.K. Veeraraghavan (2010), "Quality-Speed Conundrum: Tradeoffs in Customer-Intensive Services," *Management Science*, forthcoming.

## Jerath, K., S. Netessine and Z.J. Zhang (2007), "Can We All Get Along? Incentive Contracts to Bridge the Marketing and Operations Divide," working paper.

### **Week 7, Class 2: STUDENT PRESENTATIONS**