OIDD 940

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Fall 2018

Wednesdays, 1:30 PM - 4:30 PM, Conference Room

This is an introductory doctoral course on operations management. We will focus on many classical papers, as well as discuss major recent research streams, which occupied our field in the last 10-20 years. Methodologically, we will study mathematical models as well as empirical and experimental work which has been advancing recently.

The goals of this course are (1) get you acquainted with major research streams in Operations Management (2) orient you in tradeoffs one faces in doing modeling vs. data-driven work, (3) stimulate your research ideas through paper discussions and (4) prepare you for concisely explaining key results of the paper.

This course will be primarily based on discussions of papers presented by students. A note after each paper in the syllabus indicates who will present it (myself or student) and to what extent you need to read it: skim (meaning read introduction and conclusion, and skim through the results) or read rather carefully. I highlighted papers that you need to read carefully.

There will be several homeworks which are meant to serve as a practice for applying some basic concepts. Homeworks are due at the beginning of the session. You can discuss homeworks and work together on them but each student must make a separate submission. Moreover, each student will come up with a topic for a course paper which should relate to one of the topics that we discuss. The basic idea for the paper will be due mid-course, and last session will include presentations of the course papers.

There will be many readings and a few presentations per person per course. Final grade will be a combination of homeworks, course paper and paper presentations/discussions.

Most materials are available electronically – let me know if you are unable to find any of the papers.

Guidelines for paper discussants

The discussant for each paper should become an expert on that paper: the discussant should clearly understand the model, the solution methodology and the insights. Hence, I recommend that you study syllabus in advance and form preferences over topics you want to study in details. Furthermore, the discussant should be prepared to answer questions on how the paper compares with related literature, i.e., the discussant should skim the key references in the paper as well.

Presentations on each paper should be approximately 30-35 minutes in length. I suggest using approximately 12-15 slides (NOT copies of the paper pages). Writing on the board can be used as well but it is much harder. The presentation should cover at least the following items:

- What are the main objectives of the paper, i.e., what is the author (or authors) attempting to achieve with this paper?
- Briefly describe the model. The emphasis is on brief, since the assumption should be that everyone has read the paper.
- List the key assumptions. Which are the key assumptions, i.e., the ones that are needed for analytical tractability and/or ones that are needed to obtain the qualitative insights. (Do not list all assumptions, since that would be a poor use of time.)
- What are the novel features of the model? Are there features of the model that are novel, i.e., that have not been incorporated into other research?
- Briefly describe the solution methodology. What techniques/theorems are used to obtain the answers in the paper? If the solution methodology is novel and potentially useful in other applications, then this should be emphasized.
- What are the key insights from the paper? What are the key lessons that we learn from the paper? Which are surprising? Which contradict previous theories/models?
- What directions are there for future research? How should this paper lead to additional work.

It is clearly impossible to completely cover each of these points for each paper in 30-35 minutes. Hence, the discussant should emphasize the points which are most relevant.

OIDD 940: Reading List

Class 1: Overview. Basic Inventory Models **August 29**

(no pre-readings for the first class)

1. K.J. Arrow, T. Harris, Jacob Marshak, Optimal Inventory Policy, *Econometrica* 1951. (myself)
2. Rudi, N. and S. Netessine. Lecture notes on inventory models. 2007. (myself, I will distribute a copy)

Class 2: Advanced Inventory Models and Empirical Evidence **September 5**

1. Clark, A.J. and H. Scarf. 1960. Optimal Policies for a Multi-Echelon Inventory Problem. *Management Science*, 6(4): 475-490. (student)
2. Wagner, H.M. and T.M. Whitin. 1958. Dynamic Version of the Economic Lot Size Model. Management Science, 5(1): 89-96. (student)
3. Hong Chen, Murray Frank, Owen Wu, 2005. What Actually Happened to the Inventories of American Companies Between 1981 and 2000? Management Science, 51 (7) 1015-1031. (student)
4. Rumyantsev, S. and S. Netessine. 2007. What Can Be Learned from Classical Inventory Models? A Cross-Industry Exploratory Investigation. Manufacturing & Service Operations Management, Vol. 9: 409-429. (myself)
5. Jain, N., K. Girotra and S. Netessine. 2014. Managing Global Sourcing: Inventory Performance. Management Science, Vol. 60, No. 5, 1202-1222. (myself)

September 12: No class, I am teaching in SFO (sorry!)

Class 3: Information in Supply Chains **September 19**

1. Lee, H.L., V. Padmanabhan, S. Whang. 1997. Information Distortion in a Supply Chain: The Bullwhip Effect. Management Science, 43(4): 546-558. (student)
2. Cachon, G.P. and M. Fisher. 2000. Supply Chain Inventory Management and the Value of Shared Information. Management Science, 46(8): 1032-1048. (skim)
3. Li, L. (2002). Information sharing in a supply chain with horizontal competition. *Management Science*, *48*(9), 1196-1212. (student)
4. Aviv, Y. (2001). The effect of collaborative forecasting on supply chain performance. Management science, 47(10), 1326-1343. (skim)
5. Cachon, G. P., Randall, T., & Schmidt, G. M. (2007). In search of the bullwhip effect. Manufacturing & Service Operations Management, 9(4), 457-479. (student)
6. Bray, R. and H. Mendelson. Production Smoothing and the Bullwhip Effect *MSOM* Spring 2015, p. 208-220. (student).

Class 4: Managing Variability in Supply Chains: Quick Response and Risk Pooling September 26

1. Eppen, G.D. 1979. Effects of Centralization on Expected Costs in a Multi-Location Newsboy Problem. *Management Science*, 25(5): 498-501. (myself)
2. Lee, H.L. and C.S. Tang. 1997. Modelling the Costs and Benefits of Delayed Product Differentiation. Management Science, 43(1): 40-53. (student)
3. Rudi, N., Kapur, S., & Pyke, D. F. (2001). A two-location inventory model with transshipment and local decision making. Management science, 47(12), 1668-1680. (student)
4. Fisher, M. and A. Raman. 1996. Reducing the Cost of Demand Uncertainty through Accurate Response to Early Sales. Operations Research, 44(1): 87-99. (myself)
5. Cachon, G. P. (2004). The allocation of inventory risk in a supply chain: Push, pull, and advance-purchase discount contracts. Management Science, 50(2), 222-238. (student)

Note: Wharton Empirical Conference is September 27-28. Be sure to attend!

Class 5: Supply Chain Contracting October 3

1. Pasternack, B.A. 1985. Optimal Pricing and Return Policies for Perishable Commodities. Marketing Science, 4(2): 166-176. (myself)
2. Lariviere, M.L. and E.L. Porteus. 2001. Selling to the Newsvendor: An Analysis of Price-Only Contracts. *Manufacturing & Service Operations Management*, 3(4): 293-305. (student)
3. Cachon, G.P. and M.A. Lariviere. 2005. Supply Chain Coordination with Revenue-Sharing Contracts: Strengths and Limitations. Management Science, 51(1): 30-44. (student)
4. Cachon, G.P. 2003. Supply Chain Coordination with Contracts. Chapter 6 in Handbooks in Operations Research and Management Science: Supply Chain Management (S. Graves and T. de Kok, eds.), North-Holland. (skim)
5. Kim S.-H., M.A. Cohen and S. Netessine. 2007. Performance contracting in after sales supply chains. Management Science, Vol. 53, No. 12, 1843-1858. (myself)

Class 6: Productivity in manufacturing and services October 10

1. Womack James, Jones Daniel, Roos Daniel. 1990. The Machine That Changed the World. New York: *Rawson-MacMillan.* (must read at some point)
2. Clark, K. B., and T. Fujimoto. Product Development Performance: Strategy, Organization, and Management in the World Auto Industry. Boston: *Harvard Business School Press*, 1991. (must read at some point)
3. John Paul MacDuffie. 1995. Human Resource Bundles and Manufacturing Performance: Organizational Logic and Flexible Production Systems in the World Auto Industry. *Industrial and Labor Relations Review*. Volume: 48 issue: 2, page(s): 197-221. (student)
4. Schultz KL, Juran DC, Boudreau JW. 1999. The effects of low inventory on the development of productivity norms. *Management Science*. 45(12):1664–1678. (student)
5. Tan, T. and S. Netessine. 2014. When Does the Devil Make Work? An Empirical Study of the Impact of Workload on Worker Productivity. *Management Science*, 60(6). (myself)
6. DS Kc, C Terwiesch. 2009. Impact of workload on service time and patient safety: An econometric analysis of hospital operations. *Management Science* 55 (9), 1486-1498. (student)

Class 7: Manufacturing Strategies **October 17**

1. Fine, C.H. and R.M. Freund. 1990. Optimal Investment in Product-Flexible Manufacturing Capacity. *Management Science*, 36(4): 449-466. (student)
2. Jordan, W.C. and S.C. Graves. 1995. Principles on the Benefits of Manufacturing Process Flexibility. *Management Science*, 41(4): 577-594. (student)
3. Van Mieghem, J. A. 1998. Investment strategies for flexible resources. Management Science, 44(8): 1071-1078. (student)
4. Goyal M. and S. Netessine. 2007. Strategic technology choice and capacity investment under demand uncertainty. *Management Science*, 53(2): 192-207. (myself)
5. Choudhary, V., S. Netessine and S. Hasija. Do Flexibility and Chaining Really Help? An Empirical Analysis of Automotive Plant Networks. Working Paper.

Class 8: Queueing Models **October 24**

1. Naor, P. 1969. The Regulation of Queue Size by Levying Tolls. Econometrica, 37(1): 15-24. (skim)
2. Mendelson, H. and S. Whang. 1990. Optimal Incentive-Compatible Priority Pricing for the M/M/1 Queue. *Operations Research*, 38(5): 870-883. (student)
3. Gans, N., G. Koole, A. Mandelbaum. 2003. Telephone Call Centers: Tutorial, Review, and Research Prospects. *Manufacturing & Service Operations Management*, 5(2): 79-141. (skim)
4. Cachon, G. and P. Harker. 2002. Competition and Outsourcing with Scale Economies. *Management Science*. Vol. 48, No. 10. (student)
5. Larson, R.C. 1987. Perspectives on Queues: Social Justice and the Psychology of Queueing. Operations Research, 35(6): 895-905. (myself)
6. Rothkopf, M.H. and P. Rech. 1987. Perspectives on Queues: Combining Queues Is Not Always Beneficial. Operations Research, 35(6): 906-909. (myself)

Class 9: New Product Development, Diffusion and Innovation **October 31**

1. Bass, F.M. 1969. A New Product Growth for Model Consumer Durables. Management Science, 15(5): 215-227. (skim)
2. Krishnan, T. V., Bass, F. M., & Jain, D. C. (1999). Optimal pricing strategy for new products. Management Science, 45(12), 1650-1663. (student)
3. V. Krishnan and K. Ulrich. 2001. Product development decisions: a review of the literature. *Management Science,* Vol. 47, No. 1, 1-21. (skim)
4. Girotra, K., C. Terwiesch and K. Ulrich. 2010. Idea generation and the quality of the best idea. *Management Science,* Vol. 56, No. 4, 591-605. (student)
5. Chan, T.H., J. Mihm and M. Sosa. Forthcoming. On styles in product design: an analysis of U.S. design patents. *Management Science.* (student)
6. Kagan, Leider, Lovejoy. Forthcoming. Ideation-Execution Transition in Product Development: Experimental Analysis. *Management Science.* (student)

*** We break for INFORMS conference on November 7 – no class. ***

Class 10: Product Variety: Choice and Substitution **November 14**

1. van Ryzin, R. and S. Mahajan. 1999. On the Relationship Between Inventory Costs and Variety Benefits in Retail Assortments. *Management Science*, 45(11): 1496-1509. (skim)
2. Netessine, S. and N. Rudi. 2003. Centralized and Competitive Inventory Models with Demand Substitution. *Operations Research*, 51(2): 329-335. (myself)
3. Caro, F., & Gallien, J. (2007). Dynamic assortment with demand learning for seasonal consumer goods. *Management Science*, 53(2), 276-292. (student)
4. Fisher, M.L. & R. Vaidyanathan. (2014). A Demand Estimation Procedure for Retail Assortment: Optimization with Results from Implementations. *Management Science*, 60(10), 2401-2415. (student)
5. V. F. Farias, S. Jagabathula, and D. Shah. " A Non-Parametric Approach to Modeling Choice with Limited Data. " *Management Science*, 59, no. 2 (2013): 305-322. (student)

Class 11: Revenue Management **November 21**

1. Belobaba, P.P. 1989. Application of a Probabilistic Decision Model to Airline Seat Inventory Control. *Operations Research*, 37(2): 183-197. (myself)
2. Gallego, G. and G. van Ryzin. 1994. Optimal Dynamic Pricing of Inventories with Stochastic Demand over Finite Horizons. Management Science, 40(8): 999-1020. (student)
3. Talluri, K. and G. van Ryzin. 2004. Revenue Management Under a General Discrete Choice Model of Consumer Behavior. Management Science, 50(1): 15-33. (student)
4. Netessine, S. and R.A. Shumsky. 2005. Revenue Management Games: Horizontal and Vertical Competition. Management Science, 51(5): 813-831. (myself)
5. Li, J., N. Granados and S. Netessine. 2014. Are Consumers Strategic? Structural Estimation from the Air Travel Industry. Management Science, 60(9), 2114-2137. (myself)

*** Paper ideas (1-2 paragraphs) are due on November 15. ***

Class 12: Behavioral Operations Management **November 28**

1. Sterman, J.D. 1989. Modeling Managerial Behavior: Misperceptions of Feedback in a Dynamic Decision Making Experiment. Management Science, 35(3): 321-339. (student)
2. Croson, R. and K. Donohue. 2006. Behavioral Causes of the Bullwhip Effect and the Observed Value of Inventory Information. Management Science, 52(3): 323-336. (student)
3. Schweitzer. M.E. and G.P. Cachon. 2000. Decision Bias in the Newsvendor Problem with a Known Demand Distribution: Experimental Evidence. *Management Science*, 46(3): 404-420. (student)
4. B. Uppari and S. Hasija. Modeling Newsvendor Behavior: a Prospect Theory Approach. Forthcoming, *M&SOM.* (student)
5. Shunko, M., J. Niederhoff, Y. Rosokha. 2017. Humans Are Not Machines: The Behavioral Impact of Queueing Design on Service Time. Management Science, Forthcoming. (student)

Class 13: Interface of Finance and Operations Management **December 5**

1. Huchzermeier A, Cohen MA. 1996. Valuing operational flexibility under exchange rate risk. *Operations Research*, Volume: 44, Issue: 1, Pages: 100-113. (student)
2. Hendricks, K. B., and Singhal, V. R. 2005. Association between supply chain glitches and operating performance. *Management Science*, 51, 695-711. (student)
3. Chod, J., and J. Zhou. 2014. "Resource Flexibility and Capital Structure." *Management Science* 60(3). (student)
4. Yasin Alan, George P. Gao, Vishal Gaur (2014) Does Inventory Productivity Predict Future Stock Returns? A Retailing Industry Perspective. *Management Science* 60(10):2416-2434. (student)

Class 14: Project Presentations and Conclusion **December 12**

*** Final papers (around 10 pages) are due on December 12. ***