Title:
Revenue Management Meets Inventory Management

Abstract:
Historically, Revenue Management (RM) and Inventory Management have developed as two separate fields. Although they sometimes share similar research questions (e.g., pricing), they do not always share either the same focus or methodology. In this talk, I will give an overview of several recent works that focus on applying RM techniques to inventory management problems, all of which are motivated by applications in retail. Given enough time, the plan is to divide the talk into two parts. The first part will focus on a joint inventory and pricing problem with one warehouse and multiple stores, in which the retailer needs to make a one-time decision on the amount of inventory to be placed at the warehouse at the beginning of the selling season, followed by periodic joint replenishment and pricing decisions for each store throughout the season. We study the performance of heuristic controls based on a deterministic/fluid relaxation of the original stochastic problem. Our contributions are two-fold. We first show that simple re-optimization of deterministic/fluid problems may yield a very poor performance by causing a "spiraling down" movement in price trajectory, which in turn yields a "spiraling up" movement in expected lost sales quantity (i.e., lost sales quantity keeps going up as we continue re-optimizing the model). This cautions against a naive use of simple re-optimizations in the joint inventory and pricing setting with lost sales. Second, we propose a better heuristic by combining four ideas: (1) order-up-to control, (2) linear rate adjustment, (3) replenishment batching, and (4) random errors averaging. We show for a particular choice of control parameters that the heuristic is close to optimal when demand is Poisson and the annual market size for each store is large. In the second part of the talk, I will briefly discuss other works along the same theme, including one paper that considers Lagrangian methods with dynamic adjustments in a lost-sales system with set-up cost, and another paper that uses a fluid approximation for a joint pricing and inventory problem with stochastic purchase returns and lost sales. I will discuss some insights on lessons learned when applying RM techniques in inventory-related problems. Overall, these works highlight the potential in adopting RM techniques in solving complex inventory problems.

Brief Bio:
Stefanus Jasin is an Associate Professor of Technology and Operations at Stephen M. Ross Business School, University of Michigan. His research focuses on developing tools/algorithms for predictive and prescriptive analytics, with recent applications in pricing and revenue management, assortment optimization, supply chain management, e-commerce/omni-channel logistics, and online learning. He is currently serving as the Department Editor for Revenue Management and Market Analytics at POMS. He also serves as an Associate Editor at Management Science, Operations Research, Manufacturing and Service Operations Management, and Naval Research Logistics.