Industrial & Systems Engineering
Seminar Announcement

Closed-Form Solutions for Robust Inventory Management

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Abstract: We propose and analyze robust optimization models of an inventory management problem, where cumulative purchase, inventory and shortage costs over n periods are minimized for correlated non-identically distributed demand. We assume that the means and covariance matrix of stochastic demand are known; the distributions are not needed. We derive closed-form ordering quantities for both symmetric and asymmetric uncertainty sets, under capacitated inventory constraints, in both static and dynamic settings. The behaviors of our robust strategies differ qualitatively depending on the symmetry of the uncertainty set: For instance, considering our simplest static problem, (1) if the uncertainty set is symmetric, then there is positive ordering in all periods whereas (2) if the set is asymmetric, then there is a set of periods in the middle of the planning horizon with zero orders. We also link the symmetry of the uncertainty set to the symmetry of the demand distribution. Finally, we present encouraging computational results where our solution compares favorably to previously studied, more complex robust solutions.

Bio: *Michael Wagner* is an assistant professor of operations management and the Neal and Jan Dempsey Faculty Fellow at the Foster School of Business at the University of Washington. He teaches in the undergraduate business, MBA, EMBA, and PhD programs. His research interests are decision making and optimization under uncertainty (stochastic, robust, online) applied to inventory management, logistics, contracting, and crowdsourcing. He has a PhD degree in Operations Research, M.Eng degree in Electrical Engineering & Computer Science (EECS), and dual bachelor degrees in EECS and Mathematics, all from MIT.

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