OIS Seminar

Alberta School of Business
Department of Accounting, Operations, and Information Systems

Presents:

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Topic:

Asymptotic Optimality of Order-Up-To Replenishment Policies for Serial Inventory Systems with Lost Sales

Friday, November 10, 2017
2:00pm – 3:30pm
BUS Room 3-10

ABSTRACT

We study the optimal policy for a serial inventory system under periodic review when excess demand at the retailer (i.e., the most downstream stage) is lost. When excess demand is backordered, the optimal policy is a base-stock policy with base-stock levels calculated using the algorithm of Clark and Scarf (1960). From the literature it is known that base-stock policies are asymptotically optimal for single-echelon inventory systems with lost sales as the penalty cost for lost demand grows large. In this paper, we extend this result to serial inventory systems. First, we show that an (S–1,S) inventory system is asymptotically optimal. We also show that this result is robust in the following sense: There is a large family of choices for the base-stock levels such that the asymptotic optimality continues to hold. Next, we generalize this result for (R,nQ) replenishment policies. In these policies, an order is placed when the inventory position is below a re-order level R and the order size is an integer multiple of Q units such that the inventory position after ordering equals or exceeds R. When Q=1, this equals the (S–1,S) system. Our theoretical results open up two interesting questions which we also study: (a) How cost-effective is the best echelon base-stock policy at moderate service levels (that is, 75% to 99%)? (b) Given that there is a large family of asymptotically optimal echelon base-stock policies, how can we pick one which offers good performance across a wide range of problem parameters?

(Copies of the draft paper available)