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Optimal Inventory Control with Retail Pre-Packs

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Abstract. A *pre-pack* is a collection of items used in retail distribution. By grouping multiple units of one or more stock keeping units (SKU), distribution and handling costs can be reduced, however, ordering flexibility at the retail outlet is limited. When the pre-pack contains units of a single SKU, and the retailer can only order integer numbers of pre-packs, the well-studied (R,nQ) policy is optimal. For a single-item system, we consider the case where the retailer can order both pre-packs and individual units (at increased cost). We show that the optimal policy for this case is to order into a "band," ordering as few individual units as possible. We then investigate the case where the pre-pack contains more than one SKU. For the multiple-SKU case, we characterize the optimal policy and computationally investigate the impact of demand variability, correlation of demand across multiple SKUs and the size of the pre-pack. Since the optimal policy may be difficult to implement, we investigate the relative performance of a strict order-up-to policy as well as the pre-pack only policy.

Bio-sketch: Dr. Michael Freimer is an Assistant Professor of Supply Chain and Information Systems at the Pennsylvania State University. His research interests are Operations Management and simulation methodology. He received a Ph.D. from Cornell University's School of Operations Research and Industrial Engineering (ORIE) in 2001. He then spent a year as a visiting assistant professor at Cornell's School of Hotel Administration and a lecturer at the School of ORIE. Prior to attending graduate school, he worked for an operations research consulting firm, Applied Decision Analysis, Inc. in Menlo Park, California.