Profit Estimation Error in the Newsvendor Model

ABSTRACT - We consider the Newsvendor model where uncertain demand is assumed to follow a probabilistic distribution with known functional form, but unknown parameters. These parameters are estimated, unbiasedly and consistently, from data. We show that the classic maximized expected profit expression exhibits a systematic expected estimation error. We provide an asymptotic adjustment so that the estimate of maximized expected profit is unbiased. We also study expected estimation error in the optimal order quantity, which depends on the distribution: 1) if demand is exponentially or normally distributed, the order quantity has zero expected estimation error, 2) if demand is lognormally distributed, there is a non-zero expected estimation error in the order quantity that can be corrected. Extensive numerical experiments confirm our theoretical results.

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SPEAKER BIO –Michael R. Wagner is an Associate Professor of Operations Management and a Neal and Jan Dempsey endowed faculty fellow at the Foster School of Business at the University of Washington. His research interests include optimization under uncertainty (robust, stochastic, online) as well as applications in inventory management, supply chain management, crowdsourcing and the sharing economy.

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